THE OLD TIMER'S BULLETIN

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Published for the Old Time Wireless Operator, Historian and Collector

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AWA NETS (EST)

SSB:
Sun. 7247 kHz at noon (NCS: N4FS)
3837 kHz at 5 PM (NCS: W2ICE)
Tues. 14274 kHz at 2:30 PM (NCS: varies)
3837 kHz at 8 PM (NCS: N4FS)
Mon.-Wed.-Fri. 3837 kHz at 9:30 AM (NCS: W2ICE)
CW:
7050 kHz (NCS: varies)
Daily at 4 PM; first Wed. of each month at 8 PM

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FROM THE EDITOR

"Wireless" is AWA's middle name, so there's no harm in doing a special issue focused on "wireless" history and technology. Here it is: 13 items dealing with radio between 1899 and 1922, plus a variety of articles on later topics. Page 6 gives the first details on this year's AWA Conference at Rochester. Besides other features, this quarter's issue offers the unusual total of five pages of want ads.

NEW PUBLICATIONS INDEX AVAILABLE

In celebration of 30 years (!) of AWA publications, a full index is now available. It extends the 1989 index to OTB Vols. 18-29 forward a year and incorporates material from the index to OTB Vols. 1-17. Besides the OTB, it covers the AWA Review and the independent monographs produced from 1978 to 1982. Copies are obtainable at no charge by sending a self-addressed large-size envelope with 65 cents' postage to your editor at 44 E. Main St., Flemington, NJ 08822.

FOOTHILL MUSEUM FIGHTS BACK

Be sure to check the Museum News on page 46. The situation of the Foothill Electronics Museum got abruptly worse early this year but now looks much more hopeful. As a former Foothill College student, I feel a personal interest in this case, but so should anyone who believes in first-rate museums. Even with donated legal help, the Perham Foundation needs donations to fight this case. . . let's go . . .

BULLETIN MECHANICS

Articles on paper, preferably double-spaced, are acceptable as always. However, a growing number of AWA writers use word processors. Especially for longer items, we welcome copy on disk, either unformatted ("ASCII") or formatted via Microsoft Word. We use mainly 5-inch double-sided double-density (DSDD) disks, but can readily take the newer double-sided high-density (DSHD, 1.2 meg) and the older 160-kb *IBM/DOS-compatible* formats. (Include a paper printout to be sure!) This gets long items into the OTB a lot sooner and more accurately than retyping by hand.

As for photos: note Bob Dennison's helpful article in the February issue. Take lots of shots - to a professional, the basic unit of exposure is the *roll*. Choose the best ones and send in good-sized prints (3" X 5" or 4" X 6") so the quality will stay sharp when the printer re-shoots them.

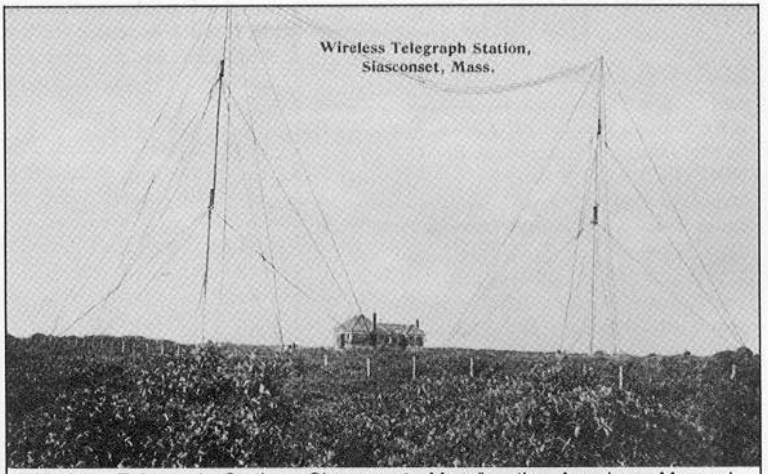
COVER: WIRELESS POSTCARDS

"Wireless" reached the consciouness of the public about the time of the picture-postcard craze (ca. 1907-1915), so numerous radio-related subjects were preserved in color lithographs. Postcard collectors today have access to these treasures via the active "paper" market.

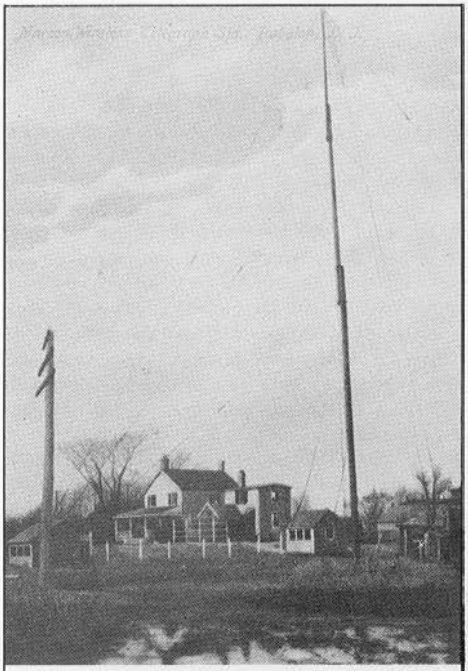
Our cover subject is one such postcard. The original is marked with the legend "I

HAVE A WIRELESS FOR YOU" with the unrelated motto "CQD - Come Quick Danger." Bob Merriam reports having, in the New England Wireless and Steam Museum, the same litho artwork, but as a much larger print housed in a carved oak frame adorned with a telegraph key.

Numerous wireless stations appeared on postcards, as these examples show.

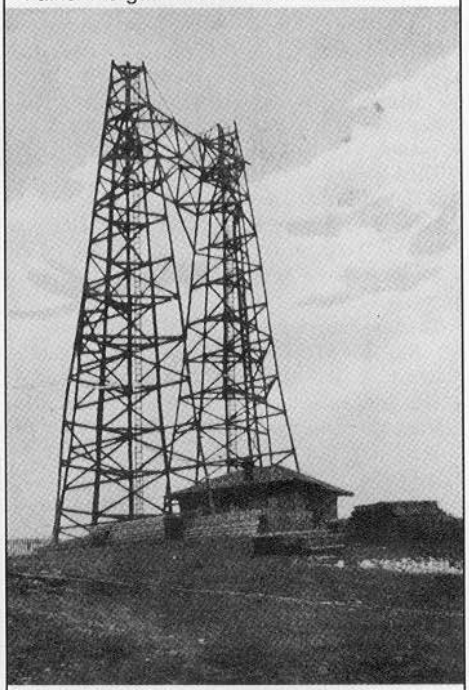


"Wireless Telegraph Station, Siasconset, Mass": the American Marconi station SC, later MSC, that received a distress call in 1909 from the sinking liner SS Republic. Wireless, and the Republic's operator Jack Binns, were credited with saving 1400 lives. The station used a Marconi 10" spark coil and magnetic detector.



"Marconi Wireless Telegraph Sta., Babylon L. I.": the shack described, in its preserved state, in the November OTB. The shack is the small building at the foot of the spliced poles; the house behind it was the station agent's dwelling and Marconi operator school. Photo: Henry Bookout, N2FCZ.

"Father Murgas' Wireless Station": one of the



Universal Aether Telegraph Company experimental stations, probably the one at Scranton, under construction, ca. 1904-5. (The August 1989 OTB gives the Murgas story in more detail.)

AWA NEWS

CALENDAR

April 21 - NEARC swapmeet, Nashua, NH
May 4-5 - IHRS-AWA spring meet, Plymouth, IN
May 5 - AWA New York spring meet, Holcomb
May 11-12 - Northern NJ meet, Tranquility
May 18-19 - NARC/AWA "Radio Daze," Bloomington, MN; also Rochester Amateur Radio Association (RARA) and ARRL convention
June 14-16 - ARCA convention, Cincinnati
July 12-14 - MARC-AWA "Extravaganza"
September 12-15 - AWA conference, Rochester

NEW HAMPSHIRE SWAPMEET - NEARC

Saturday, April 21

This came in too late for the February OTB, but may still be helpful . . . for this year's meet or 1991's. The New England Antique Radio Club will hold its Spring Swap & Sell Meet at Resurrection Center, 449 Broad Street, Nashua.

Club members will have over 70 tables of antique and collectible radios, TVs, parts, books, magazines and related items. Special events: contests featuring Catalins and one-tube sets; a seminar on "Radio Repair for Beginners."

Hours are 8 AM to 1 PM. Early buyer admission is $5 (8-9 AM) and general admission is $1 (9 AM - 1 PM). Proceeds to benefit NEARC.

To reach Resurrection Center, take Rte. 3, Exit 6. Turn at the light onto Rte. 130 and travel west 1-1/2 miles. Watch for the NEARC Swapmeet signs on your right.

For more information about the meet or membership, call or write NEARC, PO Box 809, Contoocook, NH 03229, (603) 746-6127.

INDIANA MEET - IHRS/AWA

Friday & Saturday, May 4-5

Organized by the Indiana Historical Radio Society with AWA at the Holiday Inn, 2550 N. Michigan Ave. Plymouth, IN 46563 (near US 30 and US 31 on SR 17).

Friday: Noon: buffet in the dining room, then early registration; 3:30: "show and tell" restoration clinic; 7:00: "Old Tyme Movie," AWA Show, and reception.

Saturday 9:00: registration in lobby; swapmeet in north parking lot; 9:30: registration for Old Equipment Contest; 10:00: enter auction items; 10:30: contest judging (10 categories); Noon: buffet, as before; 1:00: auction (10% donation to Museum Fund); 4:00: more swapmeet; 6:30: social hour; 7:00: banquet/awards.

For full details, send an SASE (quickly) to Ross Smith, 1133 Strong Ave., Elkhart, IN 46514. Registration at the door: $5. For room reservations ($39 single, $45 double), contact the Holiday Inn on 219-936-4013, and mention IHRS/AWA for special rates not available on the "800" number.

NEW YORK SPRING MEET - AWA

Saturday, May 5

Local meet, dinner, and clearance sale at the AWA Annex and American Legion Hall, NY 5 & US 20, Holcomb, NY (2 mi. E. of Museum). 10:30 AM: Surplus-equipment auction. Everything goes; no minimum! Noon: Buffet dinner in Legion Hall ($6, incl. auction card). 1:00 PM: Appraisal contest, open to members attending dinner. 1:30 PM: Auction of members' equipment. Direct sale to buyer; no minimum. Auction card required ($1).

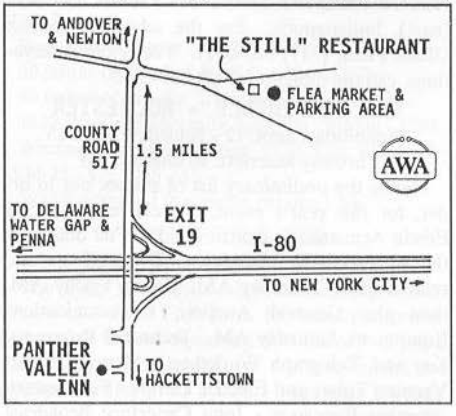
Dinner reservations **must** be made by May 1; reservations will not be accepted at the door. Write or phone **now** (don't send money): Bruce Kelley, 716-657-7489, Main St., RD #3, Holcomb, NY 14469, or Lauren Peckham, 607-739-5443, Ormiston Rd., Breesport, NY 14816.

NORTHERN NEW JERSEY MEET - AWA

Friday-Saturday, May 11-12

"The Still," Tranquility, NJ, Sussex County Rte. 517, 2 mi. north of exit 19 of I-80 (Allamuchy exit) (same as last year).

During previous meets, AWA members have been staying at the Panther Valley Motor Inn on Friday night, joining us for dinner at "The Still" that evening. We are expanding that practice with a Friday program of interest to the men and their ladies. Substantial motel discount on reservations made through me by virtue of my (W2WIY)



status as a local resident. Flea market and luncheon Saturday. Planned luncheon speaker: Gene Black, W2LL, on the life of today's marine operator.

Reservations for dinner on Friday or lunch on Saturday must be made in advance. For details of the weekend, send an SASE to: John (Hammie) Richardt, W2WIY, 94 Bald Eagle, Hackettstown, NJ 07840, 201-852-3475.

MINNESOTA MEET - NARC/AWA

Friday-Saturday, May 18-19

The Northland Antique Radio Club will present "Radio Daze '90" with AWA at the Hotel Seville, 8151 Bridge Rd., Bloomington, MN 55431. Swapmeet-programs-contest-luncheon. For more information, write NARC, Box 18362, Minneapolis, MN 55418 or contact Jim Thompson, (612) 822-4000.

OHIO CONVENTION - ARCA

Thursday-Saturday, June 14-16

Antique Radio Club of America annual national convention at the Ramada Inn, Sharonville, OH (Exit 15 from I-75). Special theme: Crosley and WLW. Flea market, talks, VOA site tour, equipment contest, museum tours, banquet. For information, contact Lloyd McIntyre, 304-344-5488. Hotel contact (group No. 491), 513-771-0300. (Program verification by courtesy of Bill Denk)

MICHIGAN MEET - MARC/AWA

Friday-Saturday, July 12-14

The Michigan Antique Radio Club and AWA will present the annual "Extravaganza" at the Holiday Inn, 7501 W. Saginaw, Lansing MI 48917, 517-627-3211 (Note the addition of July 12). Open-air flea market and 50/50 raffles; inside auction to be conducted by Steve Waldron; programs; donation auction on Saturday; equipment contest. Contact: Jim Clark, 1292 Starboard, Okemos, MI 48864, 517-349-2249.

INDIANA MEET - IHRS

Friday-Saturday, June 22-23

IHRS will hold its midsummer meet at the Howard Johnson's motel, Post Road and I-70 (east), Indianapolis. For the schedule, contact Glenn Fitch, (317) 565-6911. For room reservations, call the motel on (317) 897-2000.

AWA CONFERENCE - ROCHESTER

Wednesday, Sept. 12 - Saturday, Sept. 15

Thruway Marriott, Rochester, NY

Here's the preliminary list of events, not in order, for this year's event. Special emphasis on Edwin Armstrong's contributions. Full details in the August OTB. **Auctions**: TV receivers and related gear, Thursday AM; Tubes, Friday AM; then the General Auction; Communications Equipment, Saturday AM. **Technical Programs**: Key and Telegraph Workshop - Murray Willer; Vacuum Tubes and Electric Lamps - Fin Stewart; 'uperhet Receivers - John Caperton; Broadcast Receiver Workshop - Mel Comer; Amateur Radio Seminar - Bud Hall. **Entertainment Programs**: Life of Edwin Armstrong - Tom Lewis; An American Inventor (slide show) - Bruce Kelley; BVWS-AWA Joint Meet, London (slide show) - Ross Smith; Old-Time Radio Show - Garry Yoggy; Malaysia (slide presentation at Ladies' Luncheon) - Bob Schaumleffel. **Museum Hours**: Wednesday, 7 PM - 10 PM; Thursday, 9 AM - 11 AM (bus transportation); Sunday - to be announced. **Flea Market**. **Sightseeing Excursion**: Friday, to Niagara Falls and Niagara-on-the-Lake, Ontario.

The Thruway Marriott is a full-sized, full-service hotel about 15 minutes from downtown or the airport. The Conference Committee reports that the meeting rooms are large enough to take an AWA-sized crowd nicely. Flea-market space is paved and lighted.

The hotel is reached from Exit 46 of the New York State Thruway (I-90) - take I-390 North to NY 253 West to NY 15 South. The site is about 21 miles from the Museum at East Bloomfield and, for reference, about 19 miles from Canandaigua. For visitors arriving by air, there is shuttle service, 7 AM - 11 PM. (There is another Marriott in Rochester; ask for the correct shuttle.)

The hotel offers special nightly rates ($65 single, $75 double, $85 triple, $95 quad) up to August 17. For information or reservations, call 800-228-9290 or 716-359-1800.

SILENT KEYS

Joe Hupp
Frank Kohl, W4NM
Bob McCarty, W2EJ, per Chuck Brelsford
Anthony J. Schwind

HOLLIS BAIRD, 1906-1990

Hollis Baird, developer of mechanical television systems, died in late March at age 84. First interested in radio in 1921, he turned from design of broadcast receivers to shortwave and television development in 1928, as consultant to the William J. Murdock Company of Boston. (One of his receivers is in the Museum.) A contemporary of John Logie Baird in Britain and of C. F. Jenkins, he wrote The Romance of Short Waves and Television in the early Thirties. Baird become chairman of the department of electrical engineering at Northeastern University. He appeared as guest speaker at AWA meetings in the Sixties.

AWA REVIEW, VOLs. 3 AND 4

Volumes 3 and 4 of the AWA Review are currently available.

Vol. 3, 136 pp., contains the following articles: "Atwater Kent Radio Development, Part III - The AC-Powered Receivers" (Ralph Williams),

"Program Transmission and the Early Radio Networks" (Ludwell Sibley), "Audio-Frequency Characteristics in Early Broadcasting" (Robert Morris), "AC Supply for Radio Receivers - How the Lowell and Dunmore Patents (Almost) Changed the Industry" (Alan Douglas), "The Radio Apparatus of Ernest C. Mignon" (Lauren Peckham), "Foreign and Military Telegraph Keys" (Louise Moreau and Murray Willer), and "The Alexanderson System for Electromechanical Production of Radio-Frequency Energy" (Glen Fuller).

Vol. 4, 156 pp., offers the following items: "A Sketch of Early Radio Vacuum-Tube Research and Development at the General Electric Company" (John Anderson), "The HRO Report: Dating the Early HRO" (Charles Fisher), "Tube Manufacturing at Western Electric: The WE 300B" (Attila Balaton), "The Feminine Touch in Telecommunications" (Louise Moreau), "A Decade of Electroacoustic Reproduction (1920-1930)" (Floyd Paul), "An Elusive Frame of Television History Preserved" (William Denk), "Western Electric Tubes: Some Interesting and Historic Types" (Ludwell Sibley), and "Early Microphone History" (Bob Paquette).

To order, make checks out to AWA and mail to: Dexter Deeley, 8 Briar Circle, Rochester, NY 14618. Vol. 3, $9.50; Vol. 4, $10.50 postpaid in the U. S. and Canada (add $4.00 for overseas air mail.)

RCA 4AA condenser microphone, in Bob Paquette's Review Vol. 4 article.

BULLETIN DEADLINES

As with any publication, our production and printing process require a certain amount of lead time. If you plan to submit material for publication, please adhere to the following dates for the August issue: want ads, June 9; articles and meeting notices, June 1.

BACK ISSUES

The following issues of the Old Timer's Bulletin are in stock and orderable via Dexter Deeley. All prices are postpaid.

	Volume and Number				
1-2@	20-2	22-4	25-1	27-2	29-2
1-3@	20-3	23-1	25-3	27-3	29-3
14-4	20-4%	23-2	25-4	27-4	29-4
17-1	21-1	23-3	26-1	28-1	30-1
18-3	21-2	23-4	26-2	28-2	30-2
19-3*	22-1	24-1	26-3	28-3	30-3
19-4	22-2	24-3	26-4	28-4	30-4
20-1#	22-3	24-4	27-1	29-1	

$2.50 each, except:
@ 1-2 and 1-3, reprints for reference, $0.50 each.
* 19-3 includes Elliott Sivowitch's 20-page monograph "A Technological Survey of Broadcasting's 'Pre-History,' 1876-1920," $4.00.
# 20-1 includes Thorn Mayes' 13-page monograph "The Federal Telegraph Co., 1909-1920," $4.00.
% 20-4 includes Leland Anderson's nine-page monograph "Priority in the Invention of Radio: Tesla vs. Marconi," $4.00.
Index to Vols. 18-29 and Review Vols. 1-3, free w/purchase.

AWA LIBRARY SCHEDULE

Starting Sunday, June 10, the AWA Library will be open to members from 2:30 to 5:00 PM on the second Sunday of each month. Schedule: June 10, July 8, August 12, September 9, and October 14. It will be necessary to go to the Museum to gain admittance.

RESULTS - AWA 1989 MAGAZINE AND CATALOG AUCTION

The recent mail auction of excess periodicals and catalogs is now complete. The winning bids have been calculated, the bidders notified, and the lots shipped. Here is a resume of the winning bids. [Dex Deeley]

First four volumes of QST - $750
60 issues of "Radio" from the 20s - $262
50 issues of "Radio" from the 30s-40s - $130
1919 Wireless Specialty App. Co. catalog - $283
Wholesale Radio catalogs: 1932- $20; 1933 - $7; 1934-35 - $2; 1935 - $5
1935 Federated Purchaser catalog - $4

NOMINATIONS FOR TYNE AND TAYLOR AWARDS

The Tyne Tube Award is presented, in remembrance of Gerald F. J. Tyne, for "contributions to preserving or documenting the history of tube technology." Nominations of AWA members are needed for the 1990 award. They may be sent,

(Continued on p. 20)

THE OPERATION OF A 1903 SHIP INSTALLATION

While doing some research in the Postmaster General Museum, Sydney, Australia, AWA member Fin Stewart found a old description, apparently from a telegraphers' journal, of the visit of a Japanese battleship to Sydney in 1903. Ray Kelly published the account in his HRSA Newsletter and has given permission to use it in the OTB. It is one of the earliest descriptions on record of a wireless-station operation.

The day preceding the departure of the Imperial Japanese Squadron from South Australian waters, a party of telegraphists from the Adelaide office journeyed to the Anchorage with the avowed intention of "doing" the Flagship for all she was worth.

Immediately on gaining the deck of that vessel, one of their number interviewed the Commander, and after brief explanations the necessary instructions were issued for the party to be conducted below to the ship's "Sanctum Sanctorum" - Telegraph Office.

Our guide, Mr. Y. Takahashi, who, by the way, had visited our Operating Room and worked our jiggers earlier in the week, was delighted by the return visit on our part, and proved very affable and unceasing in his efforts to please. We were conducted by him to a compact apartment or cabin abaft the bridge on the port side.

The room seemed full of electrical gear, but a careful inspection satisfied us that there were no superfluous parts; moreover, the right position on the tables for each piece had been very carefully considered. One could not fail to notice that convenience for the operator had been aimed at here, and achieved.

A brief description of the latest Wireless Telegraph Instruments with the Modus Operandi will not be out of place in these columns.

On approaching the Flagship, we had noticed a system of parallel telegraph wires (about 20) reaching from the deck to the top of the mast. The wires were held apart by metallic rings, fixed at equal distances from each other, the whole affair resembling an elongated bird-cage. This contrivance constitutes the Aerial "Collector" or "Distributor," and is, of course, very highly insulated from the ironwork of the ship. A separate insulated wire is attached to the end of the "Aerial," which, after passing through the deck, terminates in a flexible wire and massive brass plug hanging from the roof of the cabin.

Intense astonishment was evinced by the party when their attention was directed to the induction coil. Its great dimensions drew forth more than one "Colonial" expression, perhaps more forcible than elegant! The lay mind usually associates the term "induction coil" with something akin to an ordinary medical coil a few inches in length.

The coil under notice is minus the usual vibrator or "Circuit Interrupter," and by the uninitiated, might be mistaken for an oil-drum, highly polished. Its length, however, approximates three feet, and it contains many miles of insulated wire.

Hard by was the Relay, mounted and swung on gimbals in the manner of a ship's compass. The base of it being heavily weighted, it does not follow the ship's motion but retains an upright position. Some ordinary plugs and switches, a massive sending key, and an ordinary Morse ink-writer, nearly completes the outfit; but the most important part of the receiving apparatus (the Coherer) was stowed away in a metal box and so protected from undesirable electric disturbances.

The Marconi Coherer consists of a small glass tube, partially exhausted of air, each end being fitted with a silver plug. A tiny pinch of nickel and silver filings, with a mere trace of mercury, is placed in the space (about 1/16 of an inch) between these plugs. So long as the filings remain loosely together, they offer very great resistance to the passage of an electric current, but is is found that, under the influence of the transmitting spark, which may be many miles away - minute though the disturbance is - the Coherer feels it; the filings cling together or cohere, and their resistance instantly falling to a few ohms, a bridge is made for the local battery current to pass, which local current actuates the Relay. The Relay, of course, brings into play a separate local battery and the ink-writer (or Recorder).

After each signal it is necessary to disturb the filings to terminate that signal and prepare them to receive the next. This is done automatically, a small hammer gently tapping the Coherer at the right moment.

To begin active operations, the massive brass plug (which as mentioned above connects with the "Aerial") was moved from "receive" to "sending" standard. The sending battery (charged accumulators) was now switched on, and the "Circuit-Interrupter" put in motion. This contrivance consists of a separate electro motor, of beautiful design, and performs much the same duty as the vibrator on the end of an ordinary medical coil.

By means of an ingenious electric slide, the strength of sending current is increased at will,

according to the distance it is desired to communicate. During our visit an Ampere-Meter on the wall indicated three amperes of current, this being sufficient to communicate for a distance of 12 miles. The slide, if utilised to the full extent, would throw 10 amperes throught the "primary" of the induction coil, this being the necessary current required (with these instru-ments) to communicate 40 miles.

Our guide now depressed the key, which action immediately produced a powerful electric spark between two highly polished metal balls, placed in a corner of the office. This "spark-gap" is adjustable, the metal balls being set about two inches apart during our visit. Every tap of the key produced really a torrent of two-inch sparks of great energy, the duration of the sparks being long or short, according to key movement. This is the mode of transmission. The act of moving the massive brass plug a moment earlier placed one ball in direct connection with the "Aerial," the other ball being always earthed. Every spark gives rise to a peculiar electric oscillation in the Ether which surrounds the molecules of all matter.

These oscillations are called Hertz waves. They radiate in all directions. We are now sending energy away into space, through the side of the Flagship, through our own bodies, penetrating the walls and roofs of buildings on shore, but the waves manifest themselves only on the Coherer (or Coherers) in sympathy or previously tuned to receive them.

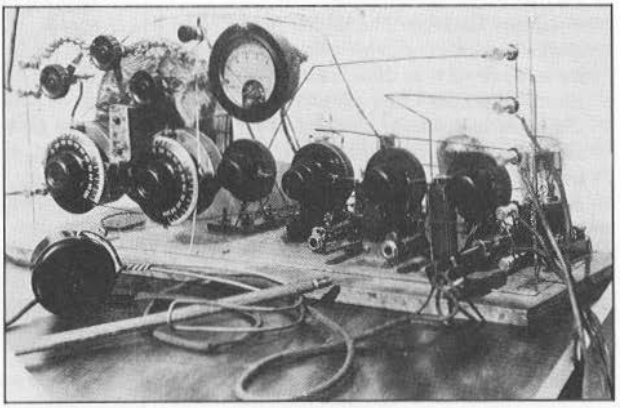
We expressed a desire to speak with the ship "Matsunshima," and our guide promptly began calling "D." The signal must have been audible outside the room, owing to the violent "snap" of the spark. (The operator is practically manipulating young streaks of lightning.) After a few calls had been made, the "Interrupter" was turned off, and the delicate Coherer thrown in circuit with the "Aerial." The party waited with an expression of great expectancy, but no response came. Our guide remarked that as it was just dinner time on board that vessel, no doubt all hands were too busy to hear the call.

He then tried the "Itsukushima," which was anchored further out. Presently a bell tinkled and a quivering noise was heard (the tapper-back). Our guide started the tape mechanism, and to the amazement and delight of the visitors, beautiful signals were received on the Morse ink-writer. They seemed to be coming in from nowhere.

The Japanese use precisely the same code as we do, but we acknowledged ourselves beaten when trying to translate Japanese words. The signals were there perfect in every respect, but our minds were pre-occupied trying to realize the magnitude of Marconi's marvellous achievement, and we acknowledge ourselves beaten again; for it is undoubtedly the most wonderful discovery ever made by the mind of man.

A MYSTERY RECEIVER

Ed Allison (Sacramento, California) asked for help in identifying this receiver. As a guess, it's circa 1922, possibly a Reinartz circuit with four tipped UV-201 tubes. Components are mounted on a panel of glass. To the probable consternation of the builder long ago, a glass-style crack runs vertically at the right of the inboard tuning capacitor.



Although there appears to be a detector tube with three stages of audio (with four filament rheostats), only one audio transformer is visible. The presence of three phone jacks suggests the use of two resistance-coupled and one transformer-coupled audio stages. The voltmeter reads 0-10, typical for a filament meter. The picture was found with some papers in the local flea market. The name Twitchell is written on the back.

A GLIMPSE OF WIRELESS DAYS

Leland Anderson
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The following is taken from portions of testimony given for the case Marconi Wireless Telegraph Company of America vs. National Electric Signaling Company (1914). I came across this material in the course of doing research on a historical paper. When pieced together, it sounds as if the speakers are conversing. Therefore, I took the liberty of "inventing" an occasion where they might have gathered but without changing any of the remarks.

The scene: post-WW I, at a meeting of the IRE in New York. John Hogan, Jr., Samuel Kintner, Jessie Murphy and Adam Stein, Jr., are reminiscing about experiences in operating spark sets and alternator transmitters.

John Hogan: I have heard both kinds of transmitters [i. e., high-frequency alternator and spark sets] and know that the spark set, even when the quenched gap is used, for equivalent power is much more noisy than the sustained-wave machine. With the machine used as in the Boston transmission, the complete sending outfit was so quiet in operation that the clacking of the relays could be heard, whereas with the spark set used for equivalent distance of transmission the roar is tremendous and can be heard a long distance from the operating house.

Although the quenched gap is more quiet than the open rotary gap, a powerful quenched-gap set is noisy as well because of the brush discharges on the condenser and other incidental sounds. I have never heard a quenched-gap set in which the noise was confined solely to the rotating machinery, as in the case of the sustained-wave generator.

Samuel Kintner: The sounds produced by a spark set, with an open-air spark gap, rotary gap, for instance such as those used by the National Electric Signaling Company and by the Marconi Company and others, produces a very intense and crashy sound when you are in the transmitting room; in fact, the noise is almost deafening. This sound is so loud that a person standing a quarter to a third of a mile away from the Arlington station [constructed by NESCO for the Navy] could read the signals just from the sound coming from the station. With the continuous-wave type, there is no spark discharge whatever and no noise except just the usual windage noise of rotating machinery.

John Hogan: I recall in the demonstration of the Sayville station [Atlantic Communication Company, Long Island], with the quenched-spark gap in 1915, that when the set was in operation I could hardly hear what anybody was saying, even when his mouth was close to my ear. It was difficult to speak in the room with it while it was in operation. The noise was that of the rotating machine, plus that of the brush discharges on the condensers, plus that of the blowers on the quenched gap, plus other incidental noises.

Samuel Kintner: I remember there was a coil of rather large diameter hanging from the ceiling of the Brant Rock station, and there were a lot of other apparatus there; but the station was in a very spectacular condition, with these large discharges taking place, and such a frightful noise.

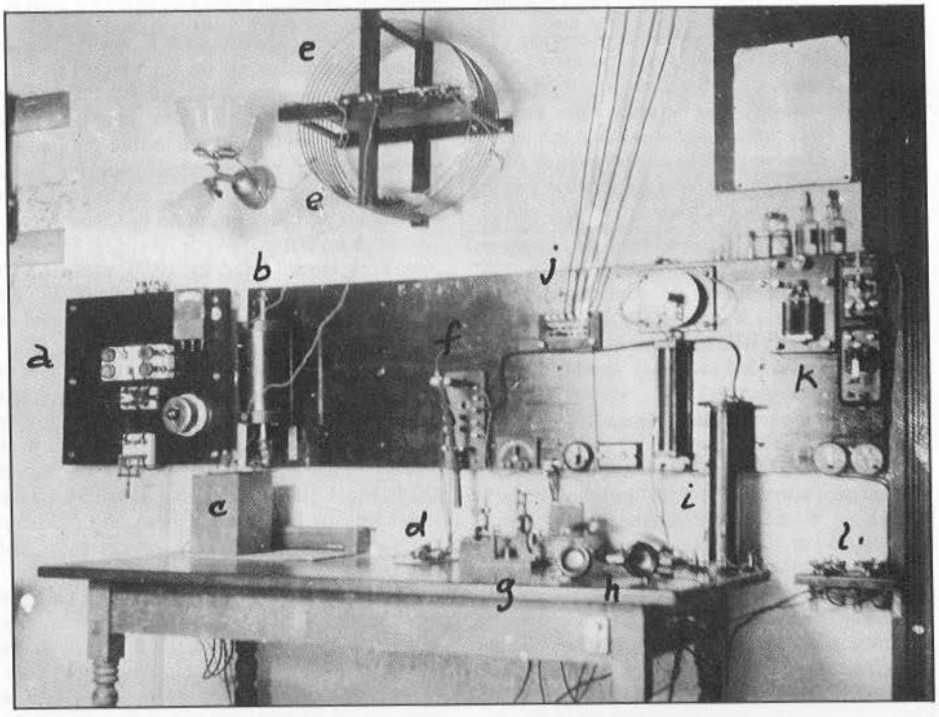
Jessie Murphy: I noticed that there was an awful lot of fireworks at the top of the Brant Rock tower every night before the cages [to add lumped capacity to the antenna] were put on.

Adam Stein: As you would look at the tower at night [after the cages were added], you could see no discharge from the tower proper, although you could occasionally see a slight leak over some of the insulators in the guy wires. There were insulators with tin cans over the top of them, to protect them from the weather, and you could occasionally see a slight brush discharge over these surfaces.

I recall a shaft of one of the alternators freezing in its bearing because of faulty lubrication. These were rather flimsily constructed machines and they operated at a high speed. The difficulty that made one smash up was the fact that the shaft had been slightly bent. One of its critical speeds was near the running speed and required more power than we had been giving it to pull it over the critical speed. Simply, when a machine is coming from zero speed up to its running speed, there are certain points where the shaft vibrates quite strongly and then drops out and becomes still again. While we were fooling around to decide whether to give it more power and force it over or not, the bearing froze and it smashed up. Sometimes the wires would get disconnected at the critical speeds. . .

Those were the days!

1907 AMATEUR STATION



1907 Photo of Amateur Wireless Telegraph Station "XY" of Lloyd Espenschied in Attic of 1369 Dean St., Brooklyn, N. Y.

a. Power panel, extra fuses handy on top!
b. Transmitting spark coil.
c. Wehnelt electrolytic interrupter.
d. Antenna-ground helix, auto-transformer; plate-condenser within, spark gap on front.
e. Sending key on table.
f. Against wall, the send-receive switch.
g. Receiving detectors, electrolytic and crystal.
h. Head phones.
i. Receiving tuning units, slide contacts.
j. Plug switch for receiving antennae, two antennae were east-west branches of telegraph line.
k. Telegraph relays and sounder.
l. Telegraph keys for line to other amateurs and Children's Museum.

All of the wireless apparatus was home-made; lathe and work-bench to left and back in picture (out of view).

You don't find photos of amateur stations much older than the one above. This one is a contemporary of "WJW," the station in Newark pictured in the September, 1980 OTB. The owner of "XY," a very early AWA member who died only four years ago, wrote up the boxed description. He had been 18 years old at the time of the photo. [Photo and Espenschied notes, courtesy of Bruce Kelley]

The neighborhood telegraph line is a quaint touch. A great many early radio operators were able to work Continental Morse on the air, and American Morse on a land wire, equally well.

Note the dual light fixture: a gas burner on top, an electric lamp below. The Espenschied household was among the 8% (yes, only 8%) of American dwellings that had electric lights in 1907. At the time the house was wired, electricity in the home was for lighting only. The "central station" would typically operate only during evening hours, shutting down around 10 PM. It would also close down during lightning storms; the service wasn't too reliable in any event. Thus combined gas-electric lighting fixtures were fairly common.

AN EARLY CHAPTER IN RADIO-ELECTRONICS

Lloyd Espenschied

Having more than casual interest in the de Forest Audion, I once asked Bell Labs inventor-historian Lloyd Espenschied what he knew about the tube, since he had attended de Forest's first lecture on it in 1907. Lloyd drafted the following article for the OTB but wanted to double-check it before printing. Unfortunately, he passed away before then. -BK

A program of the Brooklyn Institute of Arts and Sciences, received by my folks early in 1907, announced a lecture on the romantic subject of "wireless," by no less than Dr. Lee de Forest. Being an ardent wireless experimenter myself, I immediately decided to attend, inviting a couple of pals to accompany me. Not only was the subject "all the rage," but to us amateurs the man was a great hero, as he would have himself be.

Little did we know of his participation in shady promotion, nor of the fact that just that winter he had been "fired" by the crooked management of his de Forest Wireless Telegraph Co., for having deceived that management into believing they were safe in depending upon his "spade" electrolytic detector. Fessenden had obtained an injunction against the de Forest Wireless Co., and this had occasioned the firing. This actually proved to be a godsend to de Forest, for he had been experimenting with another kind of detector, the vacuum-tube Audion, and was enabled to come off holding title to its patents - just how is uncertain to this day!

I can still recall the red-curtained Art Gallery of the Institute at 174 Montague Street, which was reasonably well filled that night of March 14. There was nothing unusual that I can remember about the lecture itself except that de Forest was his usual enthusiastic self and had with him as assistant a boy of our own age - John V. L. Hogan! What does stick in my memory, in the light of subsequent events, was a strange little tube that de Forest displayed, without operating it - his latest form of wireless detector, the Audion.

He then passed it around among the audience. It didn't seem to amount to much, more of a curiosity than anything. Little did we realize that it was potentially the revolutionary electron amplifier, nor did the speaker.

We found afterward that, undaunted at having lost out with his wireless telegraph company, de Forest had started promoting the next new thing, wireless telephony, early in 1907, while continuing with his Audion patents.

The basis of the new enterprise was the Poulsen arc generator of continuous waves. This, de Forest simply "adopted," on the pretense that the alcohol environment of the arc was different in principle from the hydrogen atmosphere of Poulsen. At the time of the lecture the Poulsen arc was being experimented with for radio telephony in Europe. But there the limitations of the new art were recognized (as by Count Arco in account from Berlin, "Words Heard by Wireless," New York Herald, Mar. 23, 1907), whereas with de Forest the sky was the limit in his representations to promoters and would-be stockholders.

After the lecture we three boys hung around to make the acquaintance of de Forest and his bright assistant. This marked the beginning of a long and pleasant relationship on my part, until their demise. That evening the three of us, Austin Curtis, Frank Hart and I, walked down Montague Street with de Forest and Hogan, to the Fulton Street "El" which they took to cross the old Brooklyn Bridge to Manhattan.

Thereafter, during March and April 1907, we amateurs listened for de Forest's radio-telephone broadcasting - and heard it, the first appearance of voice and music on the air about New York. At different times, each of the three of us wrote to Hogan of our reception. These notes, perhaps the first "fan mail," were carefully preserved in Hogan's scrapbook. In later life Hogan showed me the records. I had them photostated, and sent a copy to de Forest with a note of Jan. 11, 1952.

What unpredictable events had taken place in the interval! The two main characters of that evening lecture, where the grid Audion was first publicly exhibited, are gone (Hogan in 1960, and de Forest in 1961). One of the amateur listeners has departed (Curtis) and the other two are on "borrowed time."

The story does not close, for I should relate the sequel. It shows how provoking was the Audion as de Forest left it. Of course, following the lecture each of us boys hankered to add this intriguing detector to his own little wireless station, the better to listen for de Forest's wireless telephone and to bring in more distant signals.

Frank Hart was the first to get one of the bulbs. Through "the underground" he learned where they were made, went there and prevailed upon the proprietor to sell him one. There was some fixing to do in the way of batteries and circuits, but Frank got the thing working all right. It was sensitive - signals did come in - but required

careful adjustment. It would not hold its performance for long and would glow under some conditions, blocking out the signals.

It took me longer to save up the required five dollars, for I was on a small allowance, dependent upon a grandfather dear but strict and frugal - Nicholas Espenscheid (as he spelled it), a German-born, wealthy, retired hatter. Finally, with the needed amount in hand, over the Brooklyn Bridge I went, to a certain address on Park Place.

I can still visualize the row of brownstone fronts, stores with walk-up entrances, on the north side. And I recall going up a flight of stairs to a shop, run by one McCandless, maker of little Christmas bulbs. I never thought to ask myself what right he had to sell de Forest's bulbs. The getting of them seemed to be on the "q. t." and to depend upon the whim of the owner, McCandless.

Evidently he soon realized I was a harmless amateur, for the next thing I recall was being back in my attic-workshop wireless station trying to get the thing to work. It did work, after a fashion, well enough to cause me in my exuberance, to ask Grandpa to come up and see it. It may be he had finally relented and given me the five dollars outright. Anyway, he did come to see it. I was prepared for a rather critical inspection on his part, but had not realized how insignificant the gadget would appear to him, *sans* romance.

Being concerned lest his progeny be prodigal, the first question he asked was "How much did you say you paid for it? Five dollars? For that little thing? Why, it isn't even a decent electric light!" This was a blow. I realized Grandpa thought of the good hat that five dollars would buy, and I was fearful he would "dock" my allowance, small as it was. Certainly he would have, had he known what happened soon afterward.

In trying to increase the sensitivity of the device by increasing the filament temperature (making it a better electric light, as it were), the filament burned out! My cherished little tube was done for! Even before I had obtained long-distance results, or gotten well acquainted with it. So, back to simpler electrolytic and crystal detectors I went; they seemed to be about as good. The less said about my Audion to my amateur friends the better!

It therefore did not occur to me to wonder why the Audion did not come into general use in the ensuing years. It was too mysterious and uncertain in operation, and no two bulbs seemed alike. But finally, after the lapse of five years, after which de Forest nearly went to jail for fraud in his Radio Telephone Co., and during which the Germans began realizing a true vacuum-tube amplifier, things began to happen.

De Forest's grid Audion proved to be capable of remarkable amplification, which he himself finally realized. Then others made it into a reproducible, reliable, high-vacuum tube, and the great new technology of electronics was born. Even the crystal-contact detector proved to be electronic.

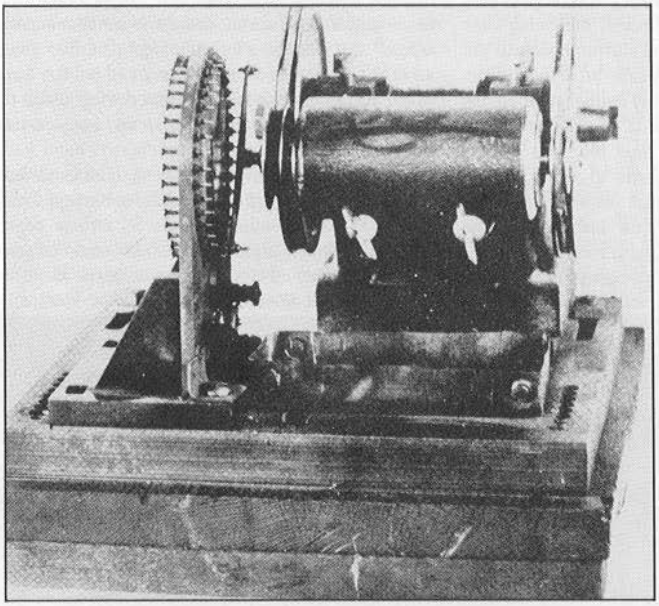
Henry W. McCandless, maker of the first audions for de Forest, using a wireless key "the first time in his life." On right, Gerald F. J. Tyne. Note that rotary spark gap on left is operating. Pictured at Delaware Valley Radio Association old-timers' meeting at Trenton, NJ, ca. 1954.

EARLY EQUIPMENT PROFILE

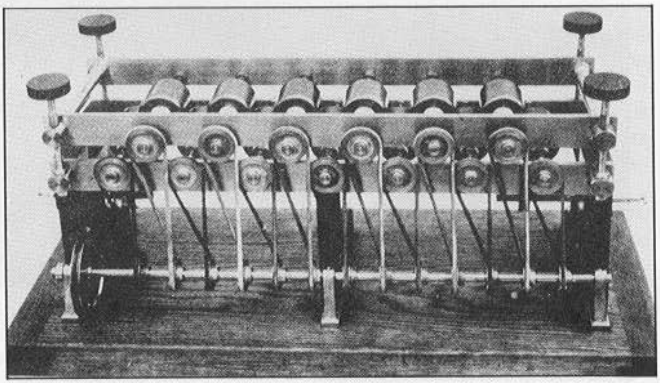
EDITED BY
LAUREN PECKHAM
Ormiston Road, Breesport, N.Y. 14816
All correspondence requires SASE for reply

MORE FESSENDEN DEVELOPMENTS

Reginald Fessenden's experiments in wireless telephone transmission, covered in last quarter's OTB, included trials of spark gaps as carrier sources. Attempts to modulate a spark transmitter were normally doomed to fail because of the inherent audio modulation from the AC power source or the gap itself. Fessenden took a different direction: use of a high-voltage *DC* power source, interrupted at a supersonic rate by a rotary gap with an unusually large number of contact points. His tests involved 5000 to 10,000 pulses per second. One of his experiments involved use of a phonograph cylinder, slotted lengthwise, as a high-speed chopper. Of course, a carrier as low as five kHz had the disadvantage of being directly audible in the headphones at the receiver, and any frequency this low could not be radiated efficiently. While these trials were overshadowed by use of an arc source of RF power, they were an inventive research direction.



Rotary spark gap giving approximately 20,000 discharges per second, to be fed from a 5-kilovolt source of direct current. The terminals are 40 percent platinum-iridium. The gap appears to be belted-up in speed four or five to one from the drive motor.



Multiple gap with rotating electrodes of brass, amalgamated zinc and graphite.

THE SPARK-AGAINST-ARC COMPETITION OF 1912

Louis R. Mateo, WB2MVK
1204 Augustina Way, Far Rockaway, NY 11691

When the U. S. Navy decided to enlarge its long-range communications facilities ca. 1911, it requested that potential builders submit bids for high-power transmitters for a comparative test at the new Arlington, Virginia, station. A synchronous spark set of the latest design, built by Fessenden at his Brant Rock laboratory, owned at that time by his former employer, the National Electrical Signaling Company (NESCO), was installed at Arlington. It was an impressive affair, rated at 100 kW. Emitting a 500-Hz note, it was a pleasure to listen to compared with the harsh sound of the other spark rigs that dominated the airwaves in those days. It was probably the most powerful transmitter of its kind in North America at the time.

Charles Elwell, an Australian by birth and an electrical-engineering graduate of Stanford University in California, saw the possibilities of the arc transmitter in commercial CW communications. He contacted its Danish inventor, Professor Valdemar Poulsen. With more promises than cash, Elwell obtained the U. S. rights to the Poulsen patent. The Federal Telegraph Company was created, with the majority of stockholders being members of the staff of his former alma mater. After experiments, failures, and modifications, they finally succeeded in establishing a link between San Francisco and Honolulu for the interchange of news. This was unprecedented DX at the time, but not too profitable moneywise.

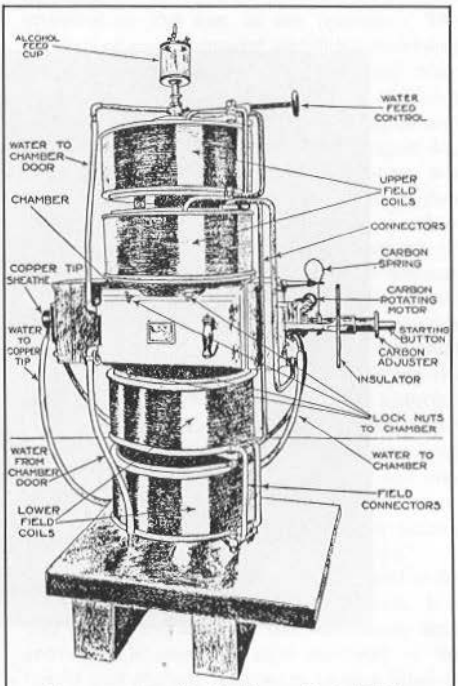
Elwell, salesman "par excellence," contacted the Navy brass in charge of the Arlington project, convincing them against the doubts of the "experts" to try an arc transmitter in a comparative test. The disparity of power, 30 kW arc against 100 kW spark, was considered unrealistic. It would have been, if both equipments used the same type of emission, but the superiority of CW was an unrecognized factor to the Navy engineers. But wanting to be fair to another U. S. company, they approved, with severe conditions.

The arc set had to be installed in such a way that it could be easily removed as soon as the tests were over. No holes were to be drilled in the walls or floor of the station, and it had to be ready to operate in a very short time. So the inverted "pressure cooker" and auxiliary paraphernalia were mounted on a provisional wooden framework.

The USS Salem was equipped with receivers of several types. She departed, bound for Gibraltar, and conducted daily tests, resulting in the following conclusions: (1) the arc signals, received during the whole trip, gave better strength and quality than the spark transmissions; (2) static affected reception less with the arc; (3) the Fessenden heterodyne detector (using a small local arc generator as a BFO) was superior to the tikker or segmented wheel normally used as an arc detector, but was unstable in operation; (4) interference did not bother the arc signals as much as the spark.

Viva the Arc! With less than a third the power, it beat the spark equipment. The wooden frame did not have to be dismantled, and after a few months of testing and deliberations, the arc was adopted as the official high-power transmitter of the Navy. Orders for construction of more powerful stations using this system went to Federal.

What about Fessenden's high-power transmitter? Because it did not meet the contract specification for 3000-mile range, the Navy bought it at a lower price than NESCO quoted at the beginning of the negotiations. Despite its limitations, it was a good transmitter. It provided service until it was replaced by a high-power tube unit in the mid-1930s. Its rotor is now in the Ford Museum at Dearborn.



Arc converter (Radio News, Oct. 1919)

REPRODUCING AN RJ-4 DETECTOR

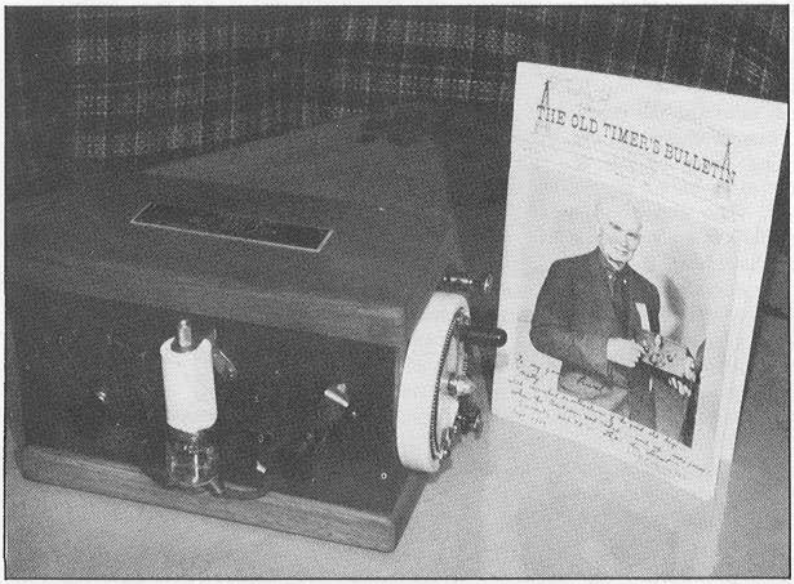
Milivoj Rudan
12 Mountain Ave. N., Stoney Creek, Ontario

I have always been fascinated with de Forest equipment items, but knew that I'd never have an original in my collection. Even a de Forest audion with open filaments would be out of my price range, not to mention a whole unit like an RJ-4 or RJ-9 detector. I remembered seeing a photo of an RJ-9 replica made by Lincoln Cundall in the OTB [1], a semi-replica of a de Forest audion [2], and a receiver using the replica [3]. (As shown in the photo, a 1983 cover illustration [4], showed de Forest proudly holding an RJ-4 in 1926, with accompanying story on the history of the audion.) After getting a Hytron HY-114B at a flea market for three dollars and obtaining the proper porcelain rheostat, I decided that it was time to make a replica of an RJ-4 detector because the RJ-9 had already been done. After modifying the HY-114B tube by adding a screw base, the biggest problem was to find the size of the original box. I measured the rheostat and compared the figures with the sizes of the box and parts in the OTB photo and came up with the approximate size of the original case. I took the photo of the name plate from another OTB [5] and had an engraver make plates at a cost of $20.

I next made a candelabra socket, brass switches and box. The worst was over. Using old binding posts, in a few weeks I was finished. The total cost of the project was about $35. I hope you will agree that it looks like a real RJ-4. I hope someday to get a spherical audion to make it look even better.

REFERENCES

[1] Vol. 15 No. 1, June 1974
[2] Vol. 21 No. 4, March 1981
[3] Vol. 28 No. 1, May 1987
[4] Vol. 23 No. 4, March 1983
[5] Vol. 22 No. 3, December 1981



THE VOICE OF UNION COLLEGE
2ADD - 2GSB - 2UC - 2XQ - WRUC

Robert Garry

Material supplied by courtesy of Bud Hall, K2LP

This monograph is material condensed from a research paper produced for the alumni of Union College, Schenectady, New York. We indebted to Mr. Robert Garry, manager of WRUC at Union. The events took place at Union during the period 1910-1921. WRUC itself began in the late Thirties as a campus "carrier-current" broadcast station, then received an educational FM license in 1975.

The history of radio at Union College dates from the earliest days of radio transmission itself and involves such names as Charles Proteus Steinmetz, Irving Langmuir, Willis R. Whitney, Walter R. G. Baker ('16), Alexander R. Stevenson, Jr., Ernst J. Berg, Ellsworth Cook ('20), Ralph D. Bennett ('21) and a host of other pioneers in communications and electronic fields.

It was inevitable that interest in radio should arise early at Union. New developments of that magnitude simply do not get past men of such caliber as Steinmetz, chairman of the Department of Electrical Engineering from 1902 to 1913, and Berg, his very able successor.

College catalogs indicate that "wireless laboratory" courses were offered early in the century. Berg himself was an authority on electromagnetic theory and Heaviside's Operational Calculus; Steinmetz' genius stands on its own merit. The result was that Union, during the early years of the century, occupied a unique and highly favorable position with respect to the promising new science of wireless communication.

Unfortunately, while college catalogs are helpful in tracing the beginning of academic interest in the subject, pinpointing the start of serious experimental work with actual transmitting and receiving equipment is not quite so easy. That something was afoot as early as 1910, has been verified by W. C. White, a consultant to the General Electric Research Laboratory and one of America's early radio pioneers. In White's words, "About the turn of the century the de Forest Company inveigled General Electric to set up a wireless communication link between Schenectady and Pittsfield works to supplement, or hopefully, to supercede its wire lines. In those days radio channels could be had for the asking, and the scheme looked feasible. . . The idea was abandoned about 1910 and [the] mast was given to Union College for experimental work and was used in our tests."

It appears, then, that 1910 is about the earliest recorded date of practical experimental work in wireless communications on Union's campus. It might well be surmised, however, that something had already been stirring; otherwise the College would have had no use for the mast, a 100-footer near the east end of the old Biology building.

So far as experimental work was concerned, the events of the next five years appear to be more to the credit of the General Electric Company than that of Union. The Company, apparently short of space, made arrangements to use a small room in Union's Electrical Engineering building in which to conduct some of its experiments.

The decision was of inestimable value to the college, for conducted in this room were some of the most important practical experiments with early vacuum tubes. The key figure in this work appears to have been White, who diligently kept notes and years later wrote Early History of Electronics in the General Electric Company.

In addition to their work with pliotron detectors and amplifiers, the GE group, at the urging of Whitney, embarked on the development of a wireless auto-alarm system that could record messages and alleviate the necessity for constant attention on the part of the operator. The moment of success proved dramatic. According to White, "Finally late one nite [sic] while working alone in the radio room at Union College, the writer got the alarm signal and recorder working. It was the nite of August 4th, 1914, I believe, and the tape recorder was clicking away merrily and the tape with its dots and dashes was rolling out in fine shape. Constant adjustment was required so that no attention was paid to the nature of the message coming in. About midnight it was decided to call it a day and the writer stuffed a number of yards of that message tape in his pocket and went home. In looking over the tape that evening, the message proved to be one of important historical significance. It came from the German-owned and -operated station (WSL) at Sayville on Long Island. It was short and repeated over and over again: 'To commanders of all German ships on the high seas; proceed at once to the nearest neutral port.' WW I had started in Europe."

Just how active a role the College played in the GE experiments that cannot be answered. It is safe to assume, however that Steinmetz, Berg and other scientifically alert members of the faculty and student body were neither blind to the developments nor far in the background.

The College came into its own in October of 1915 with the purchase of a complete Marconi wireless set consisting of a two-kilowatt sending set and a cabinet receiver. From that point on, events moved rapidly. At a meeting in the Electrical Laboratory, on October 29th, the Union College Radio Club was born, and Professor Walter L. Upson was named faculty advisor. An extension at the rear of the laboratory was set aside as a wireless room, and by the first of the year, despite troubles with the big Marconi set, a small wireless station was in operation.

Actual operations during the pre-World War I period were, of course, purely experimental or "amateur" in nature. The student newspaper, Concordiensis, noted on January 20, 1916, that communications had already been established with Cornell University, the University of Pittsburgh and the University of Michigan, even though the large transmitter was not working and the receiving equipment left a lot to be desired. The station also participated in a nationwide test conducted by amateurs for the Navy Department, in October 1916.

Considerably more is known of the Radio Club's nonoperational activities. The organization was decidedly educational as well as recreational in purpose. Concordiensis regularly reported lectures by Berg and other faculty members on radio theory and equipment, as well as instruction in both code and operating procedures. The club also conducted some notable research on aerials, batteries, and other types of equipment, one outgrowth of which was the development of a practical indoor aerial. This accomplishment drew highly favorable comment from the local press. An indication of the growing stature of the organization was its incorporation in November of 1916 as the Union College Section of the Radio Club of America.

The first chapter in the history of the Union College Radio Club ended abruptly in 1917 with the United States' declaration of war against Germany. The federal government suspended all amateur operations and ordered that transmitters be "sealed" to preclude unauthorized use.

Despite the interruption, interest in radio remained high during the war, and with the lifting of the government ban, the club was reorganized. Accompanying the revival was a shift in emphasis that was to have far-reaching effects upon radio operations at the College. Hitherto viewed only as a point-to-point communications medium, predominantly experimental in nature, radio now began to reveal itself as a means by which information and entertainment might be transmitted over great distances, to an audience not in the least technically minded.

Many reasons can be cited for the change in outlook, but foremost among them must be the rapid progress in the design and production of vacuum tubes which accompanied World War I. Tubes were an essential component of any practical radiotelephone transmitter, and radiotelephony in turn was the only medium by which a general listening audience might be reached. Union, thanks to the earlier experiments of the GE Company and the very presence of the company in Schenectady, already had a head start in this field.

What appears to have been Union's first post-war radiotelephone station, and perhaps its first post-war transmitter of any kind, was constructed by Ellsworth Cook ('20) as a special project, in conjunction with one of Berg's periodic electrical shows. Cook's own words offer a clue to what was to follow: "This station, developed primarily for the purpose of Dr. Berg's Electrical Show, did however, make regular afternoon broadcasts on those days assigned for development work. The sound source was voice and a few cylindrical records played on an Edison phonograph and directed into a microphone. Since the audience was mostly other radio amateurs and since radio telephony was still a novelty, listener boredom due to our limited supply of records was not a factor."

On the evening of October 14th, 1920, one of the most historic broadcasts in the annals of American radio originated from the campus. The Schenectady Gazette the next morning proclaimed in bold letters "College Students Give Concert by Radio Telephone." "What is believed to be the first attempt of a college radio club to give a musical concert by wireless telephone was successfully made last night at Union College," the Gazette reported. "The strains of a phonograph playing into the receiver of a radio telephone set for a 100 mile radius, were plainly heard by amateur operators within 50 miles. . . The club is now planning to give concerts every Thursday night and expects to extend the sending radius to 1,000 miles after improvements are made." Concordiensis was less restrained: "Union Again Pioneer of American College World; Operators Hurl Jazz 50 Miles Through Space."

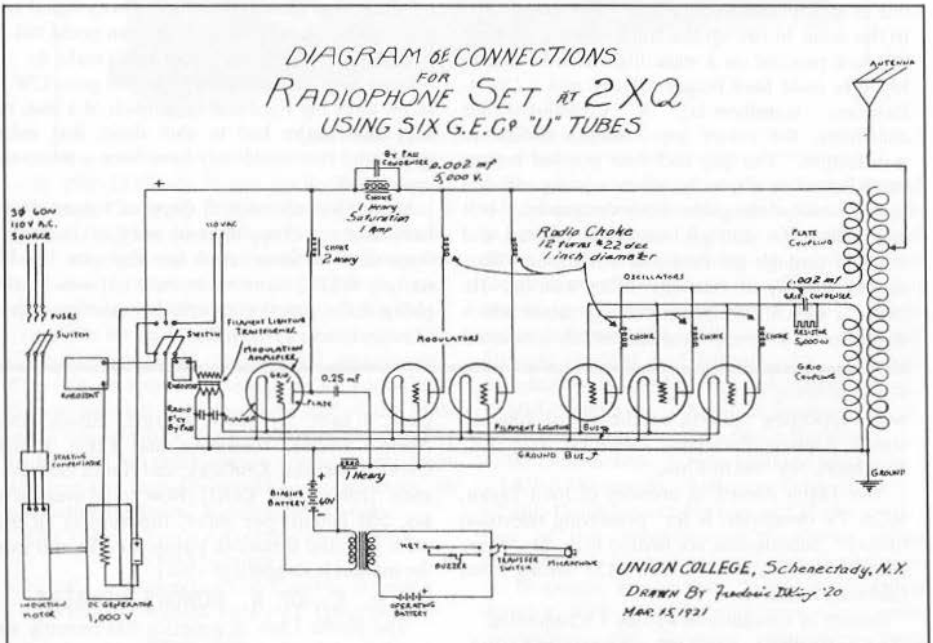
The initial broadcast ran from 8 PM to 8:15 PM and from 8:18 to 8:30. It was heard as far away as Hartford, Conn., and, other claims to the contrary, appears to have been the first previously scheduled program ever broadcast for the purpose of public entertainment in the United States. Historic claims are difficult to prove and are always open to controversy. Union's claim for 2ADD is a powerful one, how-

ever. The opening program was definitely scheduled, was announced in advance, and was successfully received by waiting amateurs. Doubly significant is the fact that it was followed by several others in the same scheduled series before KDKA in Pittsburgh began with coverage of the Harding-Cox election on November 2, 1920.

The event was followed by a string of "firsts," several of which attracted nationwide attention. Perhaps the most spectacular of these was the "baby carriage incident" of May 6, 1921. A group of Union students rigged a wireless receiving set into a wicker baby carriage and wheeled the monstrosity, complete with live baby, across the campus and through the streets of downtown Schenectady. Projecting from the top was an antenna, between the handles was the tuning device, concealed within the carriage was the vacuum-tube amplifier and associated components. Strapped underneath were the storage batteries.

All in all, considering the size and weight of 1921 equipment, the escapade added up to a very neat trick. It also added up to a sizeable piece of publicity. The reactions of those who encountered the unusual perambulator were recounted later in the Knickerbocker Press of Albany: "As the carriage was wheeled through the campus, it began to attract attention, for somewhere about it there seemed to be issuing the sound of music. . . Many a person who passed the contrivance looked inside to see where the phonograph could be concealed."

Whether their motives were humorous or serious, the members of the Union College Radio Club had unveiled what may have been the world's first portable radio.



The transmitter: a modulated oscillator using 50-watter tubes, forerunners of the UV-203. Note the option of using modulated CW transmission: operate the bottom switch, and a key and buzzer replace the carbon mike. With the constant-current (Heising) modulator, the depth of modulation could not have exceeded 50%. The MO design meant lots of incidental FM, which would have given high audio distortion. The unfiltered motor-generator for B+ must have given a distinctive commutator ripple on the air. The exact carrier frequency at any given moment would have depended on a large number of parameters like the line voltage. There were lots of chances for mysterious parasitic oscillations, and doubtless a sizable harmonic output. But this was the early Twenties, and this was *radio*!

AN EVENING AT 1AW

Fred Stafford, ex-1BAG

One chilly evening in late 1921 I got to sit beside Hiram Percy Maxim during the Transatlantic Tests. I was 16. How I wangled this invitation to 1AW I do not recall. I guess he took pity on younsters like me. Anyway, it turned out to be a memorable evening.

He met me at the door and we went into a back room. On a desk was his receiver, a Tuska 220 tuner, plus audio with VT-1s. To the right was his key, flameproof with a double knob. No changeover switch: two antennas. In front, a glass desk plate. All very neat. We sat down and put on phones, mine being Murdocks I think. The air was alive with hams. In Ardrossan, Scotland, a listening team was poised with a big superhet at the end of a Beverage wire aimed at the U. S. Each district had a 15-minute period. Ours was due at 7:15 if memory serves, so we trooped down to the cellar to fire up the transmitter, a kilowatt of spark perched on a waist-high table or bench. My eyes must have bulged. There was a Clapp-Eastham transform er, a Cornell-Dubilier condenser, the rotary gap and the oscillation transformer. The gap had four pointed bronze studs bolted to a spindle, all in a heavy wooden case. A motor alongside drove the gap by V-belt and pulleys. (A stud got loose once, I heard, and went up through the case and a hardwood floor above! Luckily, no one was in line with it.) He closed a switch, turning on the gap motor which stayed on all evening. Another switch connected the key.

Back upstairs, we listened. The first district's time had come and he began sending "T-E-S-T DE 1AW" in his usual slow and measured pace. A word about that fist of his: he never sent faster - nor slower - than 15 WPM. Each dot and dash was of the correct length and did not vary. My father, a telegrapher, admired his sending. That fist, together with the 120-cycle non-sync note, lent a sort of majesty to 1AW's signal when heard on the air. You listened respectfully. I hoped he'd ask me to send a few of those *TEST*s, but no. Anyway, here I was, an impecunious Ford-coil ham rubbing elbows with the No. 1 man in amateur radio and, for all I knew, the "Old Man" himself!

Outside, an 18-wire fan stretched between two tall masts was pushing out 1AW's lusty signal and it seemed impossible that Ardrossan could fail to hear it, but fail they did. 1AW didn't make it.

Some time thereafter we all had to go to CW. I threw away my Ford coil (not much of a loss, really) but Maxim had to shut down that noble spark, and that could only have been a traumatic experience.

Maxim was always well disposed toward young hams, like me, dropping in on our local radio club from time to time. And one day, our big BC station, WTIC, came on in code. It was Maxim giving code practice to the community with a Century buzzer at the mike!

(Continued from p. 7)

with supporting reasons, to the award administrator, Lauren Peckham, Ormiston Hill Rd., Breesport, NY 14816-9709.

The Taylor Award, in memory of John Taylor, RCA TV developer, is for "preserving television history." Submissions are invited here, too. They may be sent to Ross Smith, 1133 Strong Ave., Elkhart, IN 46514.

Receipt of nominations by July 1 is requested.

FLEA-MARKET CENSUS - CANANDAIGUA

Here are results of a census of flea-market occupancy at last year's Conference by state or province. The survey was taken between 11 AM and noon on Thursday, which, in my opinion, was the height of the flea-market activity at 141 vendors.

New York, 34; Massachusetts, 16; New Jersey, 15; Pennsylvania, 11; Ohio, 10; Connecticut, 9; Indiana, 5; Minnesota and Ontario, 4 each; Maine, Michigan, New Hampshire, Vermont, and Virginia, 3 each; Delaware, Florida, Illinois, Iowa, North Carolina, Tennessee, and Texas, 2 each; Georgia, Kansas, Kentucky, and South Dakota, 1 each. [John Nagle, K4KJ] (Now, at an average of, say, 500 pounds per seller, the number of ton-miles of radio treasures transported to and from the market is staggering! -Ed.)

R. C. OF A. HONORS MEMBERS

The Radio Club of America has recently elevated the following AWA members to the grade of Fellow, in recognition of their achievements in furthering its goals. Congratulations are naturally in order!

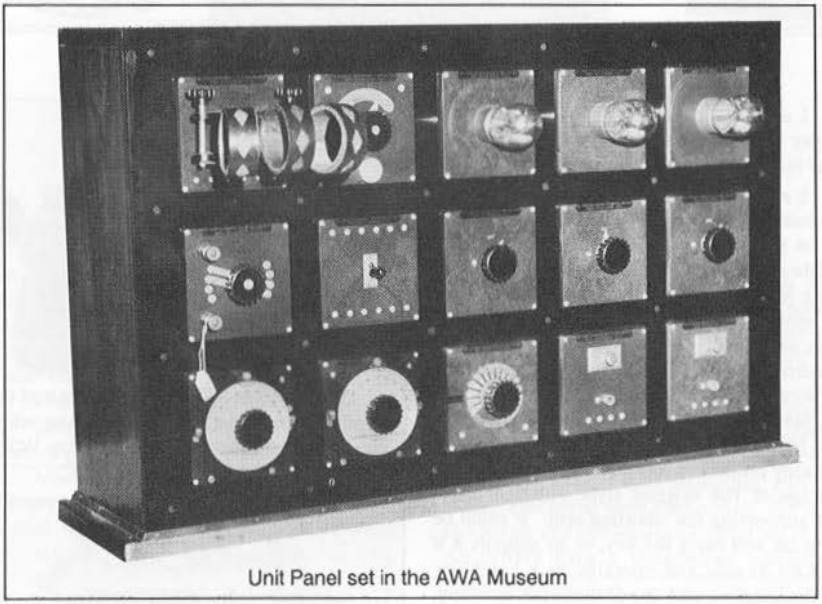
Joel I. Kandel, "for innovative designs in local government public safety land-mobile and maritime radio systems, and in digital applications for communications."

Frederick G. Suffield, P. E, "for contributions to early military and commercial airline radars, and the Stratovision television system."

(Continued on p. 35)

THE DE FOREST UNIT RECEIVING SET

H. A. Robinson, W3LW (SK)



Unit Panel set in the AWA Museum

In 1920-21 the de Forest Radio Telephone & Telegraph Company of New York introduced a distinctly original idea in receiving apparatus for radio amateurs and experimenters. It comprised the essential components and controls, each mounted on a 4-1/2" square bakelite "Unit Panel." Terminals on each unit permitted connection by the experimenter in any desired arrangement. This feature appealed strongly as an educational device, together with the flexibility of the unit-panel system which permitted the different units to be used in many circuit arrangements from wavemeters, through crystal tuner-detectors, to ultraudion receivers. Panels offered were:

ULC-100	Triple Adjustable Honeycomb Coil Mounting
U-100	Stopping Cond. and Grid Leak
UR-100	Audion Tube (VT Type) and Receptacle
UD-101	Crystal Detector (Galena)
US-100	Primary Condenser Switch - Series/Shunt
US-200	Anti-Capacity Key Switch
UF-200	Filament Rheostat
US-400	Audion-Ultraudion Switch
UCV-1000	Variable Air Condenser (90 degree), 0.001 uF
USC-1500	Loading or Bridging Condenser
U-200	Battery Switch and Phone Jack

The unit panels were usually mounted through 4" cutouts spaced on a wooden backboard of size to accomodate 6 to 15 units. The photograph shows an elaborate receiving set providing three plug-in honeycomb inductance coils, primary and secondary variable air condensers, Audion VT detector and two-stage audio amplifier, each with filament rheostat and output jacks. The coils permitted wavelength ranges as follows:

180-325 meters	Amateur Stations
525-710 meters	Ship-Shore Stations
700-1,850 meters	Navy Calling-Operating
1,850-3,350 meters	Arlington-Time
7,400-17,300 meters	Foreign and Press

One of the recommended de Forest circuit arrangements for a double-coil unit receiving set of 10 panels was a basic grid-leak ultraudion detector with primary and secondary tuning condensers, the primary condenser being switchable for series or parallel tuning. For reception of CW signals (tube, arc or alternator) the ultraudion switching placed the secondary tuned circuit from grid to plate of the detector tube. The older de Forest tube (type T-tubular) was very gaseous and hence unstable to "B" voltage. In unit-panel receivers, it was replaced by the hard-vacuum Type VT Audion with a cylindrical envelope and four-prong bayonet base (price in 1921: $7).

KEY and TELEGRAPH

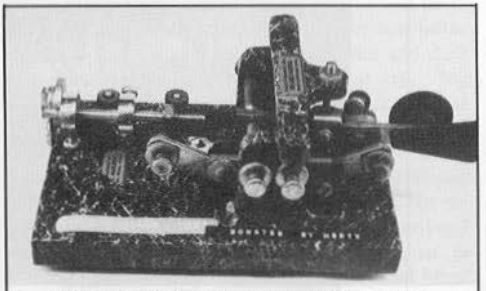
EDITED BY
LOU MOREAU
W3WRE

Q: I understand that the Mac Key used the Autoplex for its basic design and would appreciate any information you can give me on it.

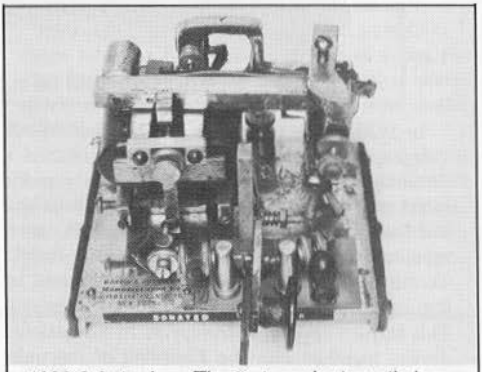
A: I suggest that the person responsible for that information was badly misled. The Mac Key came on the market in 1934. The earliest have that date on the nameplate. There were two very popular Macs; one was the original model. The other appeared after Ted McElroy had made his famous and so far unbeaten 1939 speed record: the Deluxe Mac with the teardrop-shaped base and "World's Champion Telegrapher" on the name plate. The original Mac was often preferred by marine operators because it did not slide easily on their desks. There was one other advantage of the original style with the broad bridge supporting the vibrating arm: it could be used to lift and carry the key, or to support it if turned on its side and operated as a hand key. Both the original and the Deluxe are excellent, fast instruments.

The error your informant made is that the Autoplex of Horace G. Martin in 1902-3 was the first semiautomatic key. It was battery-powered, with two magnets like those used in a sounder, to catch and hold the vibrating arm stationary for manually made dashes. It was cumbersome but was the start of the speed keys.

Then, in 1904, Martin eliminated the battery and magnets and introduced the light portable Vibroplex. It never changed in basic design, and was the prototype for all the many semiautomatic keys that have been made over the past 85 years.

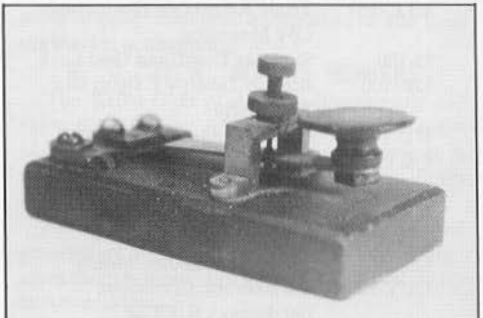


1934 Mac Key. This early model had the familar marbelized finish on the base, with the squared broad-style bridge. (Photos: W3WRE)



1902-3 Autoplex. The first semiautomatic key, it was battery-powered to make dots automatically.

Strap key. These small, inexpensive units were used at locations where sending was infrequent and brief, as at wire test stations. They also found use as test buttons in railroad signal equipment. The one pictured has plain-brass parts, including an SPDT back-contact, on a 9/16" beveled slate base. The underside is ink-stamped "W. U. TEL. CO. 3 PT. STRAP KEY 3B MFD. BY J. H. BUNNELL & CO." and bears a WU repair-station stamp.



Strap key: W. U. 3B (Photo: KB2EVN)

EDITED BY
FLOYD PAUL, W6THU
1545 Raymond, Glendale, California 91201
All correspondence requires SASE for reply

American Electric Company

Burns
RADIO LOUD SPEAKERS

The American Electric Company of Chicago advertised it had been making telephones for 30 years when it first announced horn speakers in the Fall of 1924. From 1924 to the Spring of 1927 the company was a prolific advertiser in Radio Retailing, Radio News, Radio Broadcast, Radio, Telephony, and Popular Radio magazines, among others. The original ads listed two horns: Model 205B with polished black flare, and Model 205D with a Shell Pyralin flare. Later ads called the 205D a mahogany color, while collectors today refer to them as tortoise-shell.

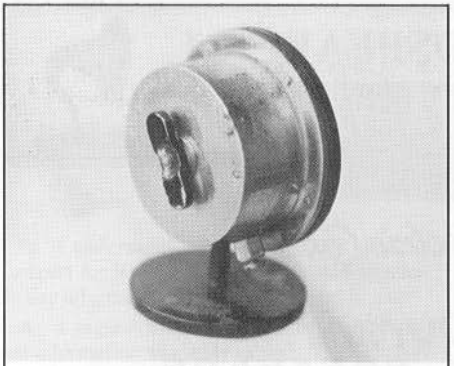
Burns 205B

Burns 205D

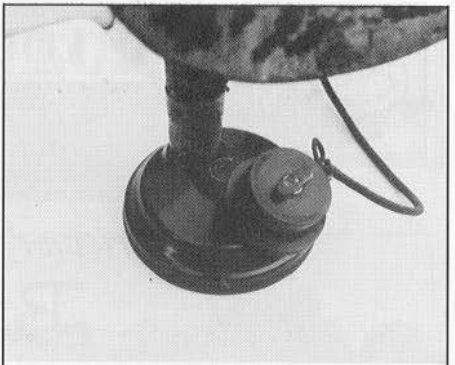
Several hues of the mahogany color have been seen, varying from light to quite dark. The author believes they were all variations of the colors used in the Pyralin mix and not different models. In 1925 a Model 205P, called "Mother of Pearl, was introduced." Also, a driver for acoustical-phonograph horns, mounted on a short pedestal arm with a base stand, was added. It was labeled Model 100. Later, another phonograph model was added, the "Concert" Model 120.

The first horn driver unit was nickel-plated and was small in size. Later a black-painted driver was added, larger in diameter. The "C" neck of the speaker was of cast aluminum, also painted black. The horns were very stylish: the bells had five petals and five separator strips, all of Pyralin. All drivers have a thumbscrew adjustment allowing the diaphragm and magnetic field spacing to be adjusted for weak and strong signal levels.

There is a collar yoke "T-bar" which swivels on the base and has the bell neck attached to one side, with the driver mounted to the other. It came in two styles. One configuration (black)



Model 100

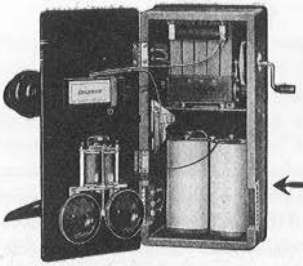


Fiber-Bell Horn

had two holes in the collar yoke. It allowed the yoke piece to slide down on a pin which extended upward from the base plate. A knurled nut on top of the yoke anchored the yoke to the base. The second collar yoke (nickel) had an attached pin extending through a hole into the base. Both collars swiveled. The yoke on the author's 205B unit is painted black, while the yoke on his 205D is nickeled. All advertising copy seen shows a picture of the horn with a collar yoke (nickel) that has no "top" thumbscrew.

The author solicited survey responses from 18 collectors known to have one or more Burns speakers. The responses of 13 collectors (plus the author) describing five mahogany and 14 black horns were used in this summary. Ten horns were reported with black drivers (3-3/4" diameter at maximum housing measurement). Eight were reported with nickel drivers (2-5/8" maximum diameter). One collector reported his black driver was 4-1/4" maximum. Eight horns had nickel-plated collars. Eleven more had black collars, all with thumbnuts holding the collar yoke down. All petal separators were reported as black. Twelve driver-coil resistances were reported by the collectors. They were from 1000 to 1200 ohms, with a median of 1100.

One collector (Furney) sent pictures of an American Electric fibre bell horn not seen before. It has a vertically mounted straight fibre neck and 90-degree angled bell on a small base, about 5" in diameter. The black-painted driver unit appears to be of the same size and shape as the nickel-plated driver on the 205D. The driver is mounted upside down on the base and has a U-shaped air tube joining the driver to the neck. The horn stands 18" high. The fibre neck and bell, plus the black-painted driver, are signs of reduced manufacturing cost. Ludwell Sibley sent the author an ad from Telephony magazine of September 9, 1924 which shows the (Furney-owned) horn to be a Model 105. Another Telephony ad suggests the name Burns came from a designer of American Electric Co. products - see the reproduction below.



BURNS' DESIGN

BELLS INSIDE

NEW MODEL X69 TELEPHONE

WITH ENCLOSED 3-INCH GONGS

New Arrangement of Standard Parts—
Latest Practice
Smaller and Neater Cabinet

Note the Slotted Plates

American Electric Company

STATE AND 64th STREETS
CHICAGO, U. S. A.

No. X69

TELECOMMUNICATION

EDITED BY
DON DeNEUF
WA1SPM

THE QUEST FOR FREE POWER

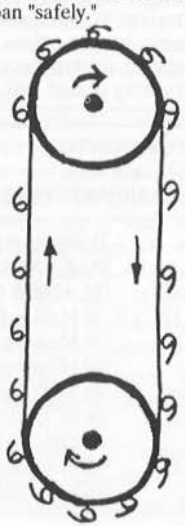
Outside the city of Rio de Janeiro is located a huge AM broadcasting station. Surrounding the station's tower area are dozens of ramshackle huts, hovels representing poverty. But each is lighted at night by fluorescent tubes deriving energy radiated by the powerful transmitter!

In Colombia one often sees in the rural areas houses near high-tension lines electrified by the dangerous technique of casting a wire over one leg of the HT line. This leads to a barrel of water in which two plates are immersed to act as a resistor, dropping the voltage from some thousands of volts to conventional house voltage. Death by electrocution is not uncommon for those pilfering power in this way.

When high-tension lines first appeared in the Midwest, stories had it that free power could be tapped off by erecting a wire loop near the power line. Enough power was induced in the loop to run a few light bulbs. It was necessary to turn the lights off by shorting the loop - opening it gave a no-load potential of several kilovolts.

Years ago the NWP railroad running from Sausalito in California to towns like Larkspur and San Rafael employed a third rail to power the trains through sliding pickup shoes. Once the railroad operators noticed a mysterious but decided voltage drop on the line two or three times a day. The railroad police finally found the cause. Some hobo deftly placed a metal sheet between the third rail and one of the track rails. It heated up beautifully and he learned how to heat his coffee pot and frypan "safely."

Those who have dreamed over the years of perpetual motion are many. Some have gone beyond the world of reality and into the ridiculous. But sometimes humor prevailed, as in that displayed in the device shown in the drawing. It consists of numerals attached to a belt revolving around two pulleys. The 9s are, of course, heavier than the 6s. Gravity pulls harder on them than on the 6s, putting the belt in motion. As the 9s disappear, replacements promptly appear at the top. [D. K. deNeuf]



DID WLW PROPEL A CAR?

On March 1, 1934, engineer Loy Barton of RCA Victor wrote a proposal to his superior, I. R. Baker. He suggested the possibility of propelling a small automobile from the signal of Crosley's 500-kW super-power station WLW near Cincinnati. This is his proposal. Did it materialize? Barton was a pioneer in class "B" audio design in receivers and transmitters. [BK; copy thanks to Norm Smith]

Some time ago I suggested to you and Mr. L. F. Jones the possibility of picking up enough energy from the WLW antenna to operate a car along the highway near the new WLW transmitter. I have checked with Dr. Brown, of the Research Division, as to the probably energy pickup at distances up to about one-fourth mile from the antenna. Some little thought has been given to possible means of converting the energy into DC for a suitable DC motor.

The results of the preliminary consideration of the problem indicate that about 200 watts may be picked up on a loop at distances up to one-fourth mile and that circuit arrangements can be devised to supply power to a 1/8 horsepower motor.

If such a motor is suitably connected to a stripped-down Austin chassis, I have no doubt that the car with at least one passenger can be started and driven at least three to five miles per hour on level pavement. It is obvious that the car should be free of boxes or other spaces that might look as if a power source is concealed.

The purpose of such a stunt is purely for publicity because it has been predicted, and believed, by many people that eventually power will be transmitted to various self-propelled devices for transportation. So far as I know, this would be the first device to be propelled from power received by radio and with the above general idea that radio will be eventually used to transmit power, I believe practically all newspapers would carry the demonstration as a news item. It would also be possible to take sound pictures of the demonstration for news reels.

The publicity obtained by the company by doing such a stunt should be the highest type . . . equivalent to a large expenditure for other types of publicity.

The cost of construction and demonstration of such a car will, I believe, be quite small as compared to the publicity derived from the demonstration. The publicity phase of the matter is, of course, the only direct benefit this company can expect from the undertaking and is also the reason I wish to submit the matter to you for your consideration.

THE JANUARY 1990 OLD-TIME CW CONTEST

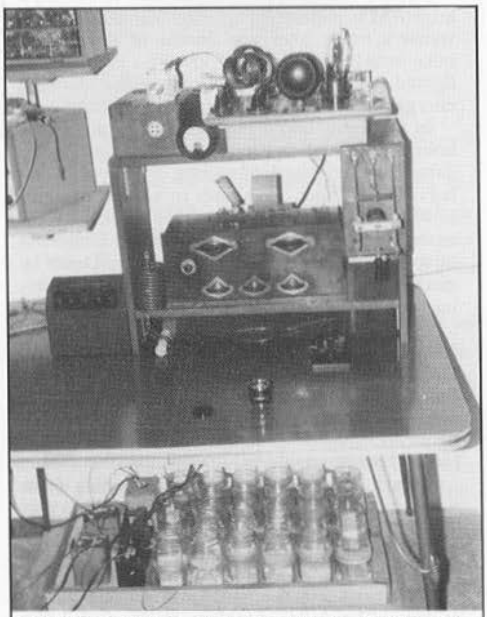
Congratulations are in order for the winner of the 1990 Old-Time CW Contest, Marshall Etter, W2ER, 'way out Rocky Point way. He had trouble getting his replica '36 Gross transmitter on the air during the first period, but made it for the second one. Marsh is a great believer in "9 watts - 90 watts." Congrats, Marsh, good work.

Our second-place winner this year is Fran Emrich, W2VDI. He is also a "9 watt" believer - he used two nine-watt transmitters. In fact, he made one QSO with VE3AUI using a WD-11 Hartley with ONE WATT input . . . or was it 0.9 W? He didn't say Wot Hopnd to it! Nice going, Fran.

Third-place station was W0OG, Larry Rosine, out in Kansas, with 25 watts. He is now looking at a QTH at least two miles from TV, SCR light dimmers, and other hash! Good luck!

In retrospect: Conditions were better this year, mostly good clean steady signals with only a few little chirps and buzzes. Twenty meters favored us with short-skip and 80 wasn't bad for long-haul . . . so c'mon, join in the fun next year!

A complete listing of stations and equipment will follow. 73 de W2BGN. [And *thanks* to W2BGN for administering and scoring the whole production - Ed.]



Old-time station of Keith Olson, W7FS, in Belfair, WA. W7FS worked a station in California with this gear: a Hartley oscillator, straight key, and 1926 Grebe CR-18 receiver. The RX is a regenerative detector and one audio stage. Note the electrolytic "slop-jar" rectifier on the floor. Photo and description courtesy of Bud Hall, K2LP.

AWA OLD-TIME CW CONTEST
A Memorial to Linc Cundall, W2LC
TOP TEN SCORES, JANUARY 1990

Score	Call	Receiver	Transmitter(s)
1573	W2ER	'36 RCA Superhet	Mod. 9 W & 90 W; '36 Gross 9 W & 90 W
1500	W2VDI	'38 Hammarlund HQ-120	'32, 42 @ 9 W; '35, 53 crystal @ 9 W
1467	W0OG	'39 Hammarlund HQ-120	'39 Hallicrafters HT-6, 807 @ 25 W
1452	N4FS	'41 Navy RBB	'39 Meissner Signal Shifter @ 9W
1368	KC0CW	'35 National HRO	'39 Homebrew, 6L6 xtal - 809 @ 95 W
1212	WB2MVK	'40 Homebrew Superhet	'40 VFO 6AG7-6L6 @ 9 W
1200	W2LYH	'36 Homebrew Superhet	'36 ECO 6K7-6V6-6V6-6L6 @ 9 W
1095	N3AYU	'34 National SW-3	'32 UV-203 Hartley @ 30 W
1092	K2OA	'38 Hammarlund HQ-120	'38 6L6 crystal @ 9 W
960	VE3CLX	'41 National HRO	'39 ECO 6K8-6F6-6V6-6V6-6L6 @ 9.5 W

COLLINS KWM-1: THE RADIO THAT CHANGED COMMUNICATIONS

Joel J. Levine, WB2BMH
38 Bamboo Ln., Hicksville, NY 11801

In 1957 the Collins Radio Company introduced a new mobile rig without realizing that it would revolutionize communications. One reviewer from QST, recognizing a new and important concept in ham gear, commented (April 1958, p. 23): "it is the writer's opinion that the KWM-1 may well mark the end of one era and the beginning of another. This unit is more than a piece of ham gear; it could be a way of life (in amateur radio)."

Collins pitched this unit primarily as an extra piece of equipment suitable for mobile operation. It was a multiband single-sideband (SSB) and CW transceiver with 200 watts PEP input, smaller than a briefcase, that weighed only 15 lbs. Does this sound like the average rig of today? The KWM-1, a clever combination of technical innovations built into a single unit, was the first modern amateur radio. Your Kenwood, Yaesu, and ICOM are all descendants of this neatly built little box. The KWM-1 transceiver combined so many innovations in one package that it is no exaggeration to state that every transceiver operating today in amateur and commercial service is a descendant of this fine piece of equipment.

Collins shattered ham radio's version of "equipment machismo," which mandated that you had to run a 1000-lb rack-mounted monster to really pack a signal on the air.

Though the astute reviewer foresaw the revolution in equipment design that the KWM-1 would cause, Collins itself did not understand the implications *and marketed it primarily as an accessory unit for mobile operation*! Amazingly, they started a revolution in compact base-station equipment but promoted the gear for a much different use.

SIDEBAND

In the early 1950s Collins launched a campaign to sell SSB equipment. Other manufacturers soon followed with their own lines of SSB gear. SSB, unlike AM, filters out one sideband and the carrier, leaving the minimum signal that still carries all the intelligence. This concept was well known to amateurs, and experimental sets were built as early as the 1930s. (See George Grammer, "Single Sideband in the Amateur Service," Proceedings of the IRE, December 1956, pp. 1829-1833.) Despite the efficiency and readability of SSB signals, the idea did not catch on until the early 1950s.

Many hams were in positions to influence communications purchasing decisions for commercial users. Some observers believe that Collins marketed SSB amateur equipment as an indirect way to reach these people during their recreational hours.

Collins sideband equipment before the KWM-1 incorporated some important innovations. These included a mechanical filter in the IF for sharper selectivity. Low intermediate frequencies with conventional tuned circuits gave good selectivity that was fine for CW, but the response curve was rounded and produced distortion of voice signals. Mechanical filters (and the next generation of improved multipole crystal filters) had a sharper selectivity curve that is much more pleasant to listen to than comparable selectivity achieved from dual or triple conversion and a low IF. The additional oscillators in a multiple-conversion receiver require extensive engineering to avoid the problem of annoying birdies.

Another innovation was the product detector. This circuit matched the signal strength with the beat oscillator signal to provide the correct level. It eliminated having to adjust the RF gain to achieve the same purpose.

These products were built into the standard cabinet enclosures and required a large table top to accommodate the bulky packages.

ENTER THE KWM-1

The KWM-1 had provisions for any ten 100-kHz bands between 14 and 30 MHz. Receiver sensitivity was rated at 1 uV for 6 dB S/N and selectivity was 3.0 kHz. It not only incorporated the latest design features, but offered a new approach to circuitry. Collins did this by rethinking the entire approach to transmitter and receiver design. Here are some of the innovations:

1. For the first time in *modern* communications equipment, Collins used many of the same circuits for transmitting and receiving. (Unsophisticated two-tube VHF transceivers made by Abbott and others in the 1930s had used single-dial control and shared circuits, of course.) This cut the number of tubes and further reduced circuit complexity and equipment size.

The combined transmitter and receiver VFO gave one-dial tuning. Virtually all other equipment of the era used separate transmitters and receivers. In some cases, these were packaged together but did not have single-dial frequency control. Other shared circuits were the IF/sideband generator (including the mechanical filter) and the low-power RF stages.

2. The most important innovation was also the

simplest. Collins recognized that transmitting SSB requires a much lower duty cycle than AM and designed the KWM-1 to take advantage of this fact. The two 6146 final amplifier tubes had a steady-state plate dissipation of 25 watts each, yet the KWM-1 was rated for 200 watts PEP. Unlike other SSB gear which was really AM equipment with a sideband adapter added, the KWM-1 broke the pound-a-watt rule with a transceiver and power-supply package designed only for SSB-CW operation that weighed 1/4 pound per watt and measured 6" by 18" by 10".

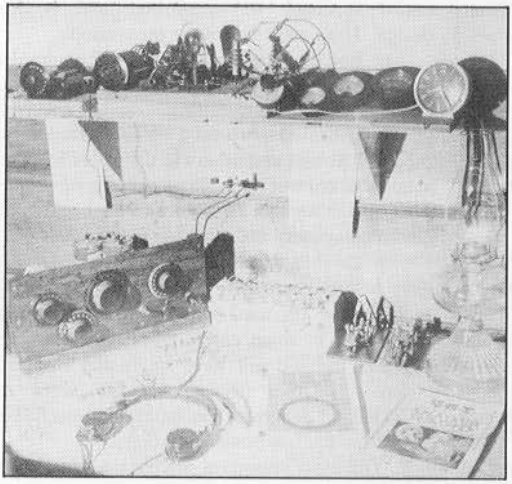
3. In addition to these unique features, Collins' designers used the best technology of the time including the mechanical filter, a product detector, one-kHz dial calibration and outboard power supplies for base or mobile operation. The DC supply was the first high-power transistorized power unit.

There was nothing like it on the market. The result was a package with the same specifications as the top-of-the-line 75A-4 receiver and the massive KWS-1 transmitter (though operating on fewer bands and at lower power). Even Collins did not fully appreciate their own accomplishment. The June 1957 advertisement announcing the KWM-1 pitched the transceiver as primarily a mobile rig; the ad in October 1957 headlined "Fixed Station Performance in a Mobile." Collins continued to advertise the 75A-4 and KWS-1. Except for the reviewer quoted above, no one seemed to recognize the impending revolution.

ANOTHER COLLINS FIRST
KWM-1
With These Firsts in Amateur Mobile Equipment:
FIRST TRANSCEIVER • FIRST SSB • FIRST VOX AND SPEAKER ANTI-TRIP CIRCUITS • FIRST ALL-TRANSISTOR POWER SUPPLY • FIRST AUTOMATIC LOAD CONTROL • FIRST PRECISION TUNED VARIABLE FREQUENCY OSCILLATOR • FIRST TO USE MECHANICAL FILTER • FIRST CRYSTAL-CONTROLLED BFO AND RECEIVER HF OSCILLATOR.

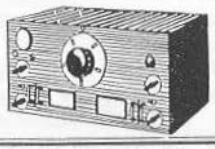
While this radio was not cheap, retailing for $850 with power supply, it was priced $500 less than the 75A-4/32S-1 combination and cost about the same as the total for a good sideband transmitter-receiver combination from Hammarlund, Hallicrafters or National.

The production life of the KWM-1 was only two years, replaced by the now-venerable and much more famous KWM-2. It was more than five years until most other manufacturers marketed a line of small multi-band SSB transceivers. My own KWM-1, after more than 30 years' service, exceeds the manufacturer's specifications with a sensitivity of .5 uV for 10 dB S/N. I am on the air with this rig weekly and get wonderful signal reports, with particular praise for the audio quality. Best of all, this little gem has withstood the test of time.



Another old-time station, that of W. C. Anderberg, W6TXR. The transmitter is a normally a 201A tube as a Hartley oscillator at three watts. Results over several years: Washington, Hawaii, British Columbia, Utah, Montana, and five other states. Transmitter power is from a 12-volt car battery and 250-V dynamotor. Receiver: a single UV-199 with movable tickler coil and 12 volts of "B." For the QSO Party last October, "WC" went high-power with a WE 216A in the rig at nine watts. With an outboard UV-199 stage the receiver, W6TXR heard W0OG, W2BJI, and W8JJY. Note the batteries and oil lamp: found in a good many amateur stations on farms in the old days.

THE COMMUNICATION RECEIVER



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RESTORING THE NATIONAL NC-46

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Almost lost in the flood of new and surplus equipment in the years immediately following WW II was a little known entry by the National Company of Malden, Mass., the NC-46. First announced in November, 1945, it was billed as an updated NC-45, the last of the prewar series of National AC-DC communications and general-coverage receivers, beginning with the NC-80 and 81 in 1937.

The NC-46, with matching speaker, sold for an economical $107.40 in mid-1946. However, the popular image of AC-DC sets being "cheap," coupled with the general-coverage design and the lack of a preselector stage, apparently resulted in a low volume of sales, and the model was eclipsed by other, more dramatic, receivers. K2MP was fortunate enough to acquire a NC-46, and discusses some aspects of his restoration, which, incidentally, are largely applicable to other radios.

ELECTRICAL RESTORATION

This AC-DC set operates from a B+ supply of just under 120 VDC. As a result, the latitude of bias voltages and other operating points is quite critical. With the larger voltage swings available on transformer sets with high B+ voltages you can get away with a little more leakage in some capacitors and a greater variance in resistor values, yet still have acceptable performance. However, with this radio, ALL values appear to be critical.

The usual paper-capacitor problems will be found and they should be replaced. Further, National used early carbon-composition resistors with the characteristic problem of absorbing moisture, greatly affecting their value and stability. This is especially true with the higher values, 100K and greater. The one-half, one, and two megohm values used in the AVC and audio bias circuits are very suspect. They should be checked and replaced as necessary.

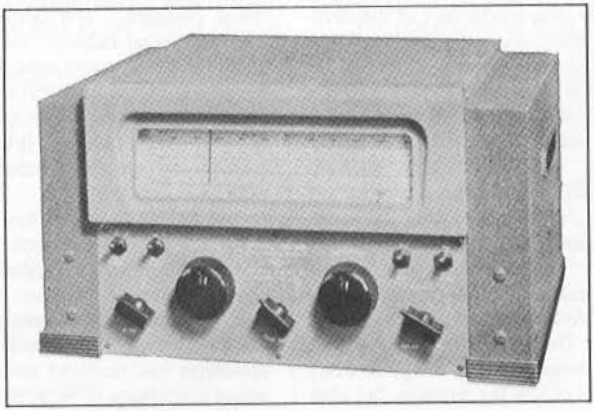
The original C-7 115-volt lamp is hard to find. A suitable replacement, although shorter, is a clear 4-watt night-light type bulb.

As with any AC-DC radio, the use of an isolation transformer on your workbench is highly advised. This not only protects you, but can save your grounded test instruments from damage as well. Caution should also be observed on the rear of the set where B+ voltage appears on the terminal strip below the speaker connections.

MECHANICAL RESTORATION

My particular receiver was in terrible condition and badly needed new paint. If you have this problem, the only way to do it correctly is to bite the bullet and take the cabinet apart. You will end up with a front panel, a front bezel, left and right sides, a rear panel, a top cover, and lots of hardware. To make it easier, save the hardware in separate envelopes, each marked for the section being removed.

Pay close attention to the insulating shoulder washers used to insulate the cabinet from the AC-line hot chassis. You will need to get ALL of these back into the correct locations to maintain this important safety feature.



Since the rear terminal strips are permanently mounted to the panel, you will have to unsolder the speaker, B+, antenna and AC power leads before removing it. The silk-screened front

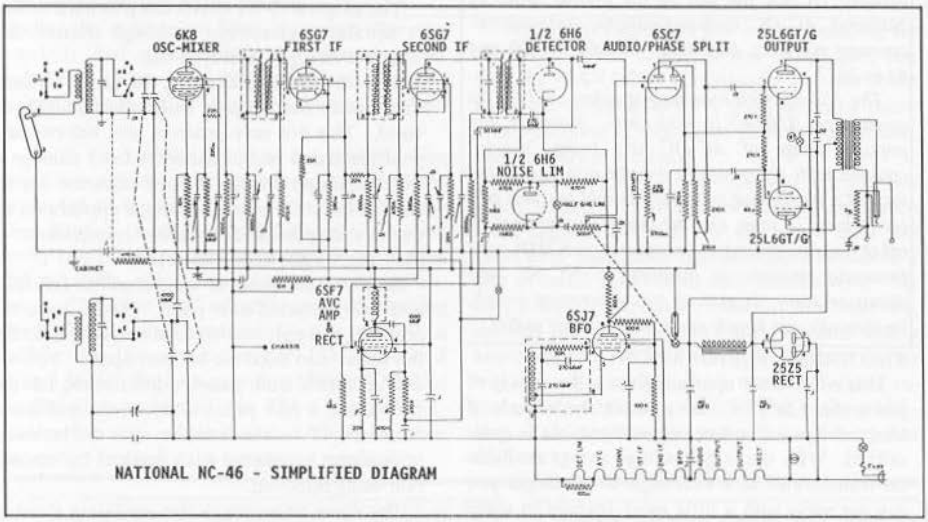
panel is finished with a smooth paint and, in my case, responded well to a mild automotive cleaner-wax.

The set I have worked when first obtained only with the bandspread control at the "SET" position. The reason became obvious when I discovered the crushed plates of the bandspread capacitor. I suppose we have all been guilty, when moving a set with a hinged top cover, of opening the cover and tossing the AC-line cord inside. We get away with it most of the time, but someday the plug or cord is going to fall into one of the tuning capacitors. One good "twiddle" of the knob and it's surgery time. A word to the wise: don't do that!

The NC-46 uses a very nice friction drive combined with dial cords to operate the pointers. A good grade of oil should be placed on the numerous shaft bearings. Do be careful, however, not to get oil on the friction surfaces of the drives. A very satisfactory and easily obtained oil is available from Radio Shack under the Archer name. It comes in a tube complete with a needle applicator for hard-to-reach spots.

For those without a manual (like me), the NC-46 is covered in good detail in Sams Photofact Folder #9 (original No. 469), page 26. The writeup in Rider's Vol. XV (pp. 15-25 to 15-28) is unusually complete for Rider documentation, constituting essentially a user instruction manual. Other information can be found in National ads in QST during 1946.

The end product is very pleasing. The two-tone gray paint contrasting with the white dial is quite unusual, as is the overall appearance of the set, making this National Company AC-DC receiver a nice addition to anyone's collection. Even a "dyed-in-the-wool" RME guy!



NATIONAL NC-46 - SIMPLIFIED DIAGRAM

The broadcast-to-30-MHz NC-46 offers a number of attractive features. The use of a separate oscillator (the triode part of the 6K8) implies freedom from annoying "birdies" that warble up and down in frequency as the signal fades, as happens in the Hallicrafters S-38. National used a straight-line-frequency tuning capacitor, a nice feature that results in relatively linear dial scales. The dual IFs with relatively "hot" tubes (6SG7s, with about twice the transconductance of 6SK7s) and iron-core transformers implies ample gain; National claimed 4.5-kHz selectivity, which is respectable for a receiver of this class and vintage. Amplified AVC and a noise limiter are quality features. The push-pull audio output (claimed power: three watts) is a way to overcome the problem of low B+ voltage, but also implies low distortion. With the good-sized external speaker, broadcast reception must be rather pleasant. The underchassis layout is tidy, with laced cabling. However, the lack of an RF stage is unfortunate; National's ads admitted the image rejection isn't much, and the noise performance of simple pentode mixers on ten meters is never great. The available bandspread on the amateur bands is quite wide, but uncalibrated.

The NC-46 shown in the catalog section of the 1946 ARRL Handbook is widely different from the production version. The illustration shows a plain box cabinet: no stepped ends. The switches and controls are placed in two vertical rows, widely separated. Presumably a prototype that received some restyling before actual manufacture. Now, *there's* a collectible!

RESTORING OLD EQUIPMENT

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THE HOT-CHASSIS SET

The preceding article on the National NC-46 brings to mind the need to warn set restorers, particularly those who have grown up with the benefit of modern consumer product-safety laws, of the dangers of hot-chassis AC-DC receivers. This is not to condemn all AC-DCs: 90-percent-plus are wired in a responsible way, with the B- bus (120-volt power line) isolated from the chassis. We are talking here about the rest, the ones with a direct metallic connection through the on-off switch to the chassis.

The dangers here are dual: accidentally ground the chassis when the line cord is plugged in the "wrong" way, and you can start a fire. Touch the chassis while standing on, say, a moist basement floor, and you can get a shock - not the harmless tingle that the "good" kind of AC-DC set will give, but potentially lethal. The NC-46 is such a case: you can hold the grounded cabinet lid open with one hand, then reach in and touch the volts with the other.

The diagrams below show the difference in design. The one on the left has an isolated bus (the heavy line) running among all the B- return points in the circuit. The chassis is isolated from the power cord by a capacitor (typically 0.01 to 0.1 uF). A resistor across the capacitor makes sure the capacitor discharges after one pulls the power plug. With this arrangement, the current into a person touching the chassis is limited to a harmless half-milliampere or so.

The circuit on the right has no such subtlety. The line cord goes right to the chassis through the power switch.

I fixed a late-Forties AM-FM set a few months ago. This one had protruding stamped metal feet with - you guessed it - hot volts on them. Don't put that one on a metal table!

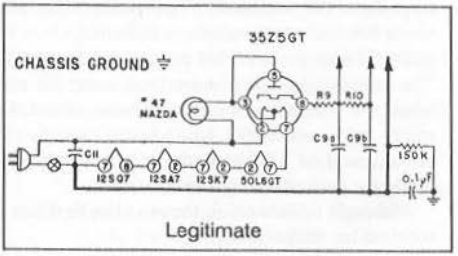
An ohmmeter test, line cord to chassis, will show whether the set is the "good" kind or a hot-chassis type. So will a quick inspection of the on-off switch wiring.

Now, there are responsible actions that we can take in working on these radios. The line cords on these sets usually need replacement from simple aging. Putting on a polarized cord is the first step. The set becomes reasonably safe if (1) the neutral (wide-blade) side of the cord is wired directly to the chassis, and (2) the on-off switch is moved to the hot lead. (A polarized cord without these changes gives only a false sense of security: Depending on how the cord is wired, the chassis is hot either all the time or, via the heater chain, when the radio is turned off.) Of course, this assumes the house outlet is wired correctly, an assumption usually - not always - true.

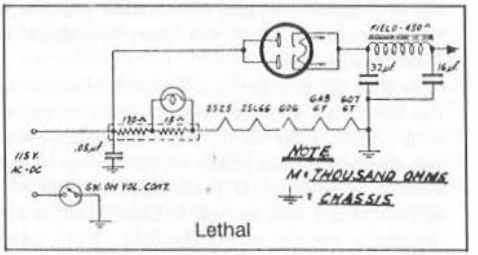
Polarized cordsets are not universally available. Fortunately, polarized extension cords, ready to have their socket ends cut off, are common.

After installing the new cord, it is easy to add safety by fixing the exposed chassis-retainer screws and loop-mounting screws. Just tap the holes with a 6-32 thread and use nylon screws. Or coat the exposed screws with liquid vinyl to insulate them. Replace metal feet with rubber ones, held on with plastic screws. Make very sure the knobs are on tight. Make new rear covers (with only small vent holes) to replace missing ones. Use an isolation transformer when working on all AC-DC sets.

It is remarkable to think, today, that supposedly responsible engineers released these designs to production. Eliminating the isolated B- bus saved a resistor, a capacitor, and maybe five minutes' wiring time. Of course, the user who

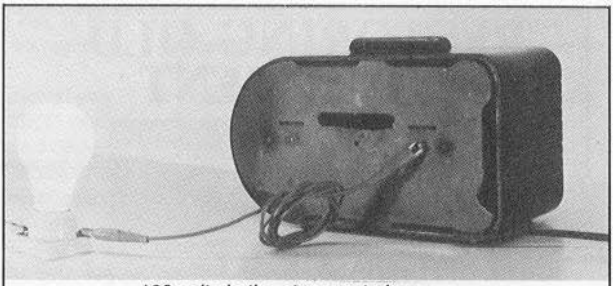


Legitimate



Lethal

touched the mounting screws on the bottom might get a surprise . . . or the listener who lost one of the knobs . . . or the owner who broke the cabinet and then moved the set out of view into the damp laundry room. The British public was offered something worse: a few hot-chassis radios with *220* volts on them!



120 volts in the strangest places . . .

In fixing AC-DC entertainment sets, I've encountered four makes that used hot chasses. All four were small to medium-size manufacturers headquartered in or near New York City. In that center of competition in consumer electronics, a few cents saved per unit on the production line may have translated into a few points gained in market share.

As for the NC-46: it is hard to imagine how National - *National*! - could have released this set or its hot-chassis predecessor, the NC-45.

The existence of these sets just points out how the views of society have evolved. At one time it was thought proper for savings accounts to have no insurance against the failure of a bank or S&L. It was once felt that no government old-age pension system was necessary. Not too long ago it was believed that hard hats and dust masks and all that other OSHA workplace safety gear was unnecessary. And it was once considered OK to sell hot-chassis radios to the consumer public.

WIRELESS IN THE SOUTH AFRICAN WAR (THE BOER WAR)

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The following supplements the "Brief History of Radio in South Africa" in the December 1985 OTB, Vol. 26 No. 3. It is printed here because of general historical importance.

In the late 1890s the Cape was a British colony whilst the Transvaal and the Orange Free State were in the hands of the Dutch descendants known as the Boers. The Boers were not happy with the situation and war was imminent.

In 1898 the Field Telegraph section of the Transvaal Artillery placed an order with the German company Siemens for wireless sets in anticipation of war. The apparatus reached Cape Town in 1899 after the war had started and was confiscated by British customs officials on arrival. An original receiver and Morse inker are now in the War Museum of the Boer Republics in Bloemfontein.

In 1899 the British did a deal with Marconi for the hire of six wireless-telegraphy sets, complete with operators, for use in the South African war. Initially the idea was to use the equipment for the control of ships at Durban. By the time the apparatus and men arrived in Cape Town it was decided to use the sets in the field. Some superior parts were taken from the confiscated Boer equipment and the sets were built into wagons so that they would be mobile.

The low-frequency transmissions demanded very long aerials for efficient operation. The aerial masts provided by both Marconi and Siemens were excessively complicated and bulky, so these were replaced with 30-foot long bamboo poles for lightness and convenience. Kites and balloons were also provided to suspend the aerials whenever weather conditions would permit.

As the wagons shook the equipment to pieces it was transferred to more suitable sprung wagons. Finally, sets were installed at De Aar, Modder, Enslin, Belmont and Orange River. The bamboo masts soon fell apart in the hot dry semi-desert Karoo and the Marconi masts were then sent up to replace the useless bamboo poles. The wind never seemed to be sufficient at both ends at the same time to permit kites to suspend the aerials. The balloons appear to have been used but even when the antenna problems had been solved they were still not able to achieve satisfactory communication as the sandy soil on top of rock made for poor earthing conditions.

Although unsuccessful, this was the first use of wireless for military purposes.

THE VACUUM TUBE

EDITED BY
BRO. PATRICK DOWD, F.S.C., W2GK

EARLY GE TUBES, 1923-29

Inquiries come in occasionally regarding early-Twenties industrial tubes made by General Electric. These occasionally come into the hands of collectors. Some of these were unique; others were like RCA products. The tables that follow, gleaned from the RCA/GE Standardizing Notices of the time, give the characteristics of the "PJ" series and list RCA Radiotron equivalents for the "PR" types. -Bro. Pat Dowd, W2GK

PJ-SERIES INDUSTRIAL TUBES

PJ-1: Gas-filled phototube
PJ-2: Train control amplifier; 4.5 V 1.1A thoriated filament; mu = 30
PJ-3: Phanotron (mercury vapor) relay rectifier
PJ-4: Train control amplifier; filament like PJ-2; mu = 8.5
PJ-5: Vacuum phototube
PJ-6: Phanotron relay rectifier
PJ-7: Train control amplifier; filament like PJ-2; mu = 30; 7.5 W dissipation
PJ-8: Special amplifier; filament like PJ-2; mu = 8.5 (RCA 5556)
PJ-9: Similar to, and superceded by, PT-842 (RCA UX-842)
PJ-10: Amplifier; mu = 8 (RCA UX-201A)
PJ-11: Amplifier; mu = 30 (RCA UX-240)
PJ-12: Amplifier-modulator-oscillator; thoriated filament, 10.0 V, 3.25 A
PJ-13: Amplifier/oscillator (RCA UX-210)
PJ-14: Vacuum phototube; 1.08 uA/lumen
PJ-15: Argon phototube, 20 uA/lumen (RCA UX-867)
PJ-16: Vacuum phototube
PJ-17: Argon phototube
PJ-18: Vacuum phototube
PJ-19: Argon phototube
PJ-20: AC gas-discharge regulator
PJ-21: Similar to PJ-8 but lower mu (3)
PJ-22: Vacuum caesium phototube
PJ-23: Argon-caesium phototube; 90 uA/lumen; 20 uA max. current (RCA UX-868)
PJ-24: Rectifier, 20 kV PIV, filament 2.5 V, 12.5A
PJ-25: Gas-filled lithium phototube
PJ-26: Mercury rectifier, 20 kV PIV, 5 A peak; fil. 5 V, 20 A (RCA UX-869)
PJ-27: Transmitting tetrode, 7.5 W; filament 7.5 V, 2.0 A (RCA UX-865)
PJ-28: Mercury rectifier, 5 kV PIV; filament 2.5 V, 5.0 A (RCA UX-866)

EQUIVALENTS OF PR-SERIES TUBES

GE	RCA
PR-1-A	UV-201
PR-1-B	UV-201A/VT-30
PR-2-A	UV-202
PR-2-B	UV-202A
PR-3-A	UV-203
PR-3-B	UV-203A
PR-4-A	UV-204/V1-8
PR-4-B	UV-204A/VT-22
PR-10-A	UV-210/VT-25
PR-11-A	UV-211/VT-4B
PR-51-A	UV-851/VT-41
FG-15	UV-857
FG-19	UV-872/VT-42

MORE ON THE TUNE-A-LITE

We reported in the last OTB (p. 17) that there was no indication that the four-electrode version of the Tune-A-Lite neon tuning indicator had actually been produced. Not so: the Fada Model RW, ca. 1933, did use it. Labeled "Type N-4" on the diagram (Rider's, Vol. IV, p. 4-14), it was wired as an interchannel noise suppressor, with a switch to turn this feature on and off. Fada had used the three-wire version the year before in its RA (74, 76, 88, 89) and RC (78, 79) models. Fada used the trade name "Flash-O-Graph"for this device. A few years later, they applied the same term to "magic eye" tubes, and even later to band-indicator lamps. It isn't certain, but the four-element Tune-A-Lite seems to have used a bayonet base like its predecessors. For a real challenge, one could try to collect all versions of the tube: two-, three-, and four-electrode.

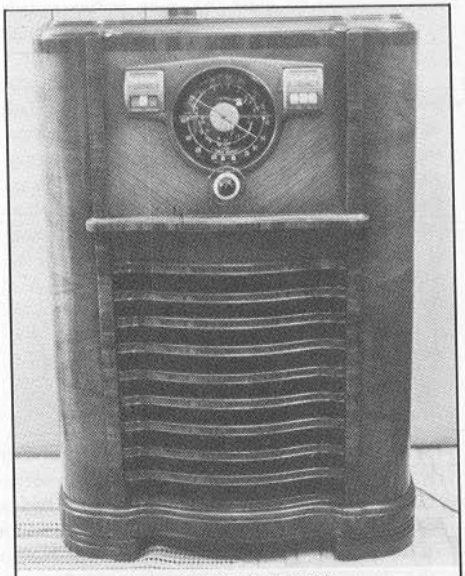
Incidentally, a restoration tip: apparently these tubes would fail to light if the biasing resistors changed value. Naturally, in any 57-year-old radio, they will have changed.

Neons, eye tubes, and meters weren't the only possible tuning aids. Several Majestic receivers like the 300-series (Rider's, Vol. III, p. 3-18) used a 6-volt bulb, fed 60 Hz through a saturable inductor, as a tuning light. The DC control current for the inductor was the plate current of the AVC-controlled RF and IF stages. The operating cycle: best tuning meant highest AVC voltage, giving lowest plate current, resulting in more inductance in the reactor, giving least light from the lamp. -LAS

MEET THE COLLECTORS

Rodney Schrock, KD3OR
402 Lincoln St., Somerset, PA 15501

ZENITH CHASSIS 8A02



A classic big-dial Zenith.

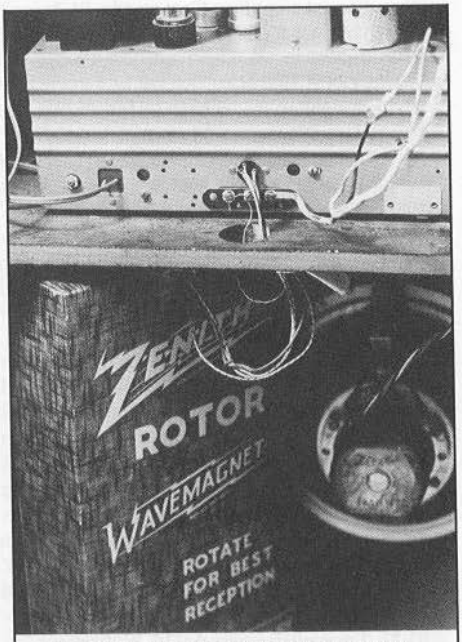
Several times a year, someone brings me an old tube-type radio for repair. Fixing them is usually easy. Replacing a tube and/or filter condensers usually clears the trouble. Sometimes a bypass condenser is shorted, one or two resistors increase in value, or an IF transformer opens or shorts. And if the radio is a Zenith from the Thirties, it usually needs a dial belt.

Let me tell you about one of these Zenith models, which I feel is outstanding. It belonged to the present owner's parents. Both owners must have treated it with great care. It was unusually well preserved and clean, appearing as though it had just been unpacked. The Wavemagnet loop antenna, a notorious collector of dirt, was very clean and its lettering wasn't the least faded. Could it be that the radio was kept for years in a light-free, environmentally stable "clean room"?

As the owner had pointed out, the volume control was intermittent. I removed the switch and sprayed the control's insides. While assembling the control, I noticed that the dial belt had deteriorated. Checking my General Cement belt book, I didn't see chassis 8A02 mentioned. Checking the JFD book, I found a belt for this chassis which was equivalent to GC #116, which was on hand.

Disassembling the dial mechanism isn't as difficult as with earlier Zeniths. It's not necessary to remove the glass, pointer, scale, etc. Just remove the retaining ring, loosen the flywheel, and slip everything out. But be careful not to lose or misplace the parts, i.e., the fiber spacers and adaptor for the volume control shaft, and remember how everything assembles. One thing which made belt replacement easier was that the belt was not part of the main drive, only the vernier. The tuning dial was operated by a loop of dial cord controlled by the belt drive.

Let's consider the radio's mechanical and physical beauty. No expense or detail was spared to promote smooth operation and ease of service, even to the "latch pins" which aided removal of the clusters of pushbuttons (station selectors and six positions of tone control) on each side of the dial. The cabinet was of streamlined design with rounded corners; the grain of the wood was matched to make symmetric pointed patterns.



The Wave-Magnet, unharmed by dirt or light. The phono leads (upper right) use shielded cable terminated in "grid caps."

The chassis was copper-colored and deep; the speaker, well built.

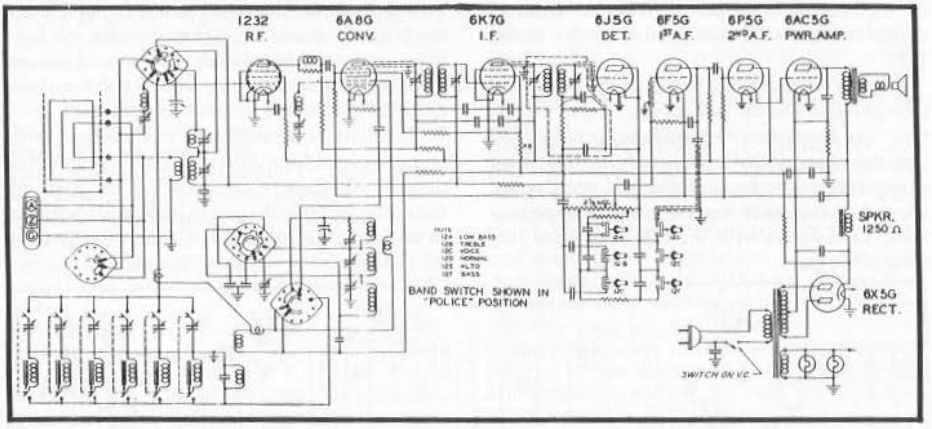
I fired up the radio and yes, the volume control and dial operated OK but it had a slight hum which didn't seem to originate in the power supply, and a lack of sensitivity with "birdies" riding on some of the stations. Examining the schematic, I noticed the link between terms A and Z on the antenna-ground terminal strip was missing. I strapped it and this strange condition disappeared. Evidently the jumper is removed for operation with a doublet antenna, and strapping A and Z unbalances the input and raises gain and selectivity on a single-wire antenna.

Looking at the schematic, we see a 1232/7G7 tube is the RF amplifier. It is a loktal tube, a sharp-cutoff pentode similar electrically to the much later 6AU6. Loktals were, of course, at that time billed as the wave of the future. Impedance coupling is used instead of a tuned RF transformer between the RF and the mixer. Since the date of the set is 1940, was this done to conserve aluminum by eliminating a condenser gang?

A 6J5 is used as a diode detector, with a 6F5 as first audio stage. Why not a single 6Q7 instead? A selling point, perhaps: "More tubes, better performance"? The 6P5 second audio direct-couples to the 6AC5 positive-grid output triode.

I put the radio in its cabinet and tried it again. All the AM stations and ham bands were at their proper places on the dial, lots of good performance on a short antenna, and AM BC never sounded better.

A relic of a bygone era: American "know-how" at its best, soon to be completely converted to war production.



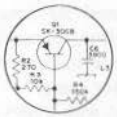
(Continued from p. 20)

Col. John G. Webb, "for contributions in the effective use of radio communications in World War II, and for unique designs of mobile radio systems for commercial applications."

Ralph O. Williams, "for the preservation of the history of radio through the Atwater Kent Museum at Orient, NY, and for work in the design and operation of missile guidance systems."

CORRECTIONS AND IMPROVEMENTS

The listing of award recipients in last quarter's OTB omitted Rudiger Walz as holder of the 1987 Tyne Award. Our apologies! Lou Moreau points out, in regard to the date of the Marconi "grasshopper" key in her column, that a vintage of 1901 to 1912 is more appropriate than that given. The original photo was marked "1909-1912," but there is strong photographic evidence that the earlier date is more likely. In the "Networks" article in AWA Review Vol. 3, p. 39, the White Network, previously identifiable as only as "PPA," apparently was operated by the Publishers' Press Association. In the WE tubes article in Review Vol. 4, p. 122, Bill Smith, N9TT, notes that the 368AS was the single-ended version of the double-ended 368A, not vice versa. On the HRO receiver article in the same issue, National receiver enthusiasts who received copies at the Conference without a sheet of minor corrections can obtain that sheet by sending an SASE to Dexter Deeley.



TRANSISTOR RECEIVERS

EDITED BY
NORM SMITH
7203 17th Ave. N.W. Bradenton, FL 34209
All correspondence requires SASE for reply

THE OLYMPIC MODEL 447

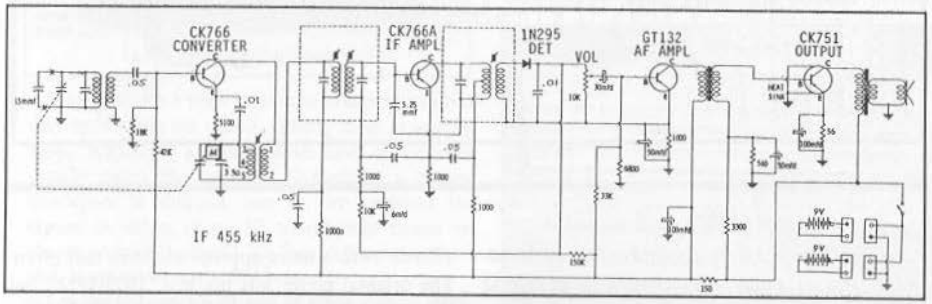
In 1955 the race was on for radio manufacturers to produce transistorized receivers. Regency had scooped the market with the release of their Model TR-1 in October 1954, just in time for Christmas. They were closely followed by Raytheon, Zenith, and Admiral. Some of the smaller companies were also quick to release their own transistor models. Olympic Radio and Television of Long Island City, NY, was not to be left out. Its engineering staff put together a workable design and rushed it into production for Spring 1955.

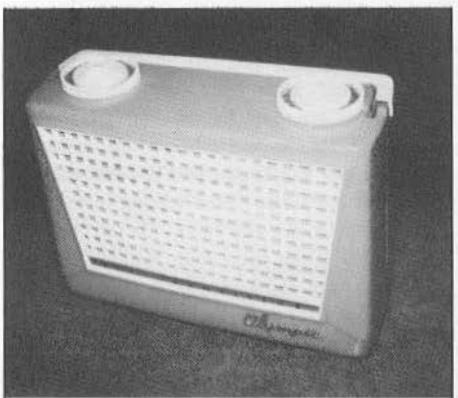
This was accomplished by modifying an existing tube portable chassis and cabinet to use transistors. The transistors were soldered in place right into the *tube sockets*! With only minor circuit changes the old tube portable was transformed into a four-transistor superhet, and Olympic was ready to compete with the big companies very early in the game.

The PNP devices used in most of these sets were Raytheon CK751, -760, and -761 units in the then-typical four-transistor arrangement using an autodyne converter, one IF stage, a diode detector, audio amplifier, and output stage. Equivalent devices made by the General Transistor Corporation of Jamaica, NY were also used.

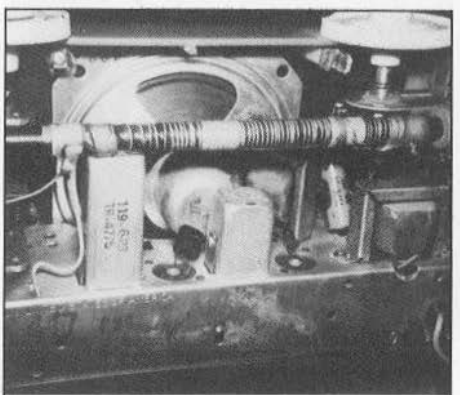
Because of the large amount of room available in the cabinet, previously used to house A and B battery packs for the tube chassis, Olympic used two large Eveready No. 276 units, nine-volt batteries connected in parallel, which would deliver hundreds of hours of play with the low current drain (25 mA) of the transistorized chassis.

This battery arrangement was common with other receivers from Admiral, Emerson, and Motorola. All these companies utilized parts of their tube portable designs to make the transition to transistorized models, but none actually used the old chassis the way that Olympic did!





Conventional tube-style case.



Transistors - in tube sockets!

IN-HOUSE

Bruce Kelley

BAD, BAD - "Spy Magazine" (September 1989) ran an article accusing a broadcasting museum in New York City of inept operation. The author didn't pull any punches. He characterizes the curator as "preening, pretentious, and occasionally embarassing and functions as the museum's own version of 'Beverly Hillbillies" Mr. Drysdale." A study reportedly indicated it would take 40 person-years to repair the damage to a once-enviable catalog system. He is accused of devoting more time to "planning celebrity-larded parties than to dry, scholarly work of running a museum." Pretty strong words. . .

VXO (variable crystal oscillator) - Those of you who were rockbound in the recent OT Contest may be interested in an article in "Ham Radio" (Feb., p. 72). It describes a simple method of varying the frequency of a crystal oscillator by several kHz, a nice shift when doubled from 80 meters.

"QM" RADIO IS QRT - On September 22, 1967, commercial operators along the East Coast made their last contact with GBTT, the SS Queen Mary, as she approached New York Harbor. Dozens of shore and ship stations made contact with her on 600-meter CW. The event was taped by Art Goodnow, W1DM. A short time later the QM was drydocked and became a museum in California with only an amateur station in operation. Now that, too, is off the air. Interested in great ocean liners of the past? Join the Titanic Historical Society, Box 53, Indian Orchard, MA 01151. It prints an excellent publication with exceptionally sharp color photographs.

PRESENT-DAY TV OBSOLETE - The electronics industry seems concerned about current TV standards and future HDTV. Why worry - both will be obsolete in 10 years since by 2000 we'll be looking at and listening to an all-digital system with its numerous advantages.

ULTRA SUB-MINIATURE TUBES - Scientists at Bellcore and numerous other labs have created vacuum "tubes" (semiconductors) so small they can be seen only through a microscope. Electron emission is produced by applying voltage to a sharp point, rather than using a hot filament. The silicon tip is 50,000 times smaller than the diameter of a human hair! I wonder how Bro. Pat will display these tubes in his museum. . .

MAJOR ARMSTRONG A LICENSED AMATEUR? Apparently not. Since this question has come up several times, I checked five government call books in the AWA Library from the first issuance (July 1, 1913) through June, 1921, and could find no call letters under the name Armstrong in the Second District. We do know he had an early amateur station and did much experimenting, but, like others of the time, never bothered (or, early enough, needed) to obtain a license. It was customary in the early days for unlicensed amateurs to use their initials or location abbreviation for call letters.

RECENT RADIO and ENTERTAINER OBITUARIES

Charles Griffen, W1GYR

Georgie **Auld**, 70, saxophonist with Goodman, Shaw; Thomas **Bodin**, 57, news director, Radio Free Europe; Duane **Bogie**, 67, TV producer, "Kukla, Fran & Ollie," etc.; Eddie **Boyd**, 73, Scots TV-radio writer with BBC; Homer **Canfield**, 83, NBC TV producer, "Dragnet," etc.; Josephine **Case**, 82, RCA board member & daughter of GE's Owen D. Young; Lindsay **Crosby**, 51, Bing Crosby's son; George Harold **Dennis**, 91, retired pres. of IT&T; Dr. Harold **Edgerton**, 86, inventor of high speed photography; Eliot **Frankel**, NBC News director, "Huntley-Brinkley Report," etc.; Frank **Gaither**, 79, Cox Broadcasting exec.; Connie **Gay**, 75, country-music station promoter; Alan **Hale**, 68, TV star "Gilligan's Island"; Alan **Handley**, 77, TV director-producer; Jules **Herbuveaux**, 92, former general mgr. of WMAQ-TV and NBC vice-pres. (reported by George Hausske); Edward **Johnson**, 69, inventor, director of RCA Research Labs.; Arthur **Kennedy**, 75, movie-stage star "Death of a Salesman," "Glass Menagerie"; Sammy **Lerner**, 86, songwriter "Falling in Love Again," "Is It True What They Say About Dixie?"; Jock **Mahoney**, 70, movie stuntman for Errol Flynn, Gregory Peck, Gene Autry; Henry C. **McBrair**, 79, RCA sonar and TV developer (thanks to the New Jersey member who sent in the obit); Jane **Novak**, 94, silent screen actress - played with Wm. S. Hart, Tom Mix, Buck Jones; Frank **Massa**, 83, sonar pioneer; Stuart **Novins**, 75, CBS news correspondent; John **Payne**, 77, movie star, "Miracle on 34th Street," etc.; Charles **Paulsen**, 69, developed videotape recorder for Ampex; Robert **Pirosh**, 79, Oscar-winning writer "Day at the Races," etc.; Robert **Quigley**, 76, producer of TV gameshows; Jimmy **Saunders**, 73, vocalist with James, Spivak, Duchin; Robert **Stull**, 88, broadcaster over Dr. Herrold's station SJN in 1909; Frank **Thomas**, 100, film, stage & TV actor; **Terry-Thomas**, 78, British film comedian; Robert **Vidalin**, 86, WW II French announcer over BBC; John **Warnick**, 64, news director & reporter: KWGD, KMOX, WMRV, VOA.

THE MAILBAG

Readers' comments on early radio topics are welcome. Because of space limitations, letters that are published may have to be edited. Send all material to the Editor.

SOVIET TUBES

In the 1960s and 1970s under Gamal Nasser, Egypt had a close military relationship with the Soviet Union. As part of the aid package, Russian electronic equipment was given to the Egyptians. After a Communist near-coup, Egypt moved closer to the West. The question arose among military men - how do we find replacement (U. S. or European) equivalents for Soviet vacuum tubes? An Italian scientist devised a cross-index for these Russian tubes to their Western equivalents.

Do you know who has a copy of said list and how I would get it? I would like to study it and publish it in "Radio," the Soviet amateur magazine. From what my relations over there tell me, this will be sincerely appreciated since Russia is still a place where the vacuum tube is king and lots of Lend-Lease radio equipment is still used by the amateur community. **G. Tilga**, WA2YIX, 128 Meigs St., Rochester, NY 14607-2035

NAVY AVIONICS

Regarding the November OTB: while I was surprised and pleased to see an issue devoted to my favorite equipment, I'd like to point out one little error. The Navy equipment on pp. 22-23 is wrong on time period; the actual time of these examples is more like 1947-49: (1) I'm not aware of any single-seat fighter with a radar in WW II; (2) According to a USN book, title I think is Readings in Naval Electronics, the AN/ARR-15 was designed as the matching receiver to the AN/ART-13 but didn't appear until 1947; (3) Earliest date I've seen AN/ARR-15 and AN/ARC-2 appear together is 1949. **Hugh Miller**, KA7LXY

[You're probably right about the general vintage of the chart. As for single-seat fighters with radar in WW II: the AN/APS-4 (ex-ASH) was a 1943 design for carrier aircraft, among other uses, light enough at 150 lb. and made in quantity (15,000 sets). It hung from a bomb rack and could be jettisoned in an emergency. It had two identical indicator units, but it appears that it was not necessary to equip both. Hence the photo of an F4U single-seat fighter with the radar. -Ed.]

FIX PIX, NO STIX

I enjoyed reading Mr. Dennison's article "How to Get Good Black and White Photos." However, I question one point: he implies that the fact that one is using a supplementary close-up lens, and is thereby getting greater magnification, in itself necessitates using a tripod.

When one does not use a tripod, the amount of blurring depends on the degree of motion of the camera during the time the shutter is open. The motion per unit of time depends on the steadiness of the photographer. The amount of time depends on the speed of the film, the stop used, and the amount of light. If there is enough light to photograph a distant mountain without a tripod, there is also enough light to photograph a person, although in the latter case, the magnification is much greater. I submit there is also enough light to photograph a very small object using a supplementary close-up lens. In fact, one has an advantage: one can usually rest one or both elbows on the table supporting the object being photographed; an option not available to the standing photographer of the mountain or person.

I am a very inexpert photographer, but have been successful in taking sharp pictures of very small radio parts and other objects in bright sunlight, using the now-discontinued Pentax Auto-110 (an SLR useing 110 film). I use the stronger of the two close-up lenses for it, focused at minimum distance, with the camera hand-held. I see no reason why similar results could not be obtained with a 35-mm SLR. Of course, I got strong shadows. Having read Mr. Dennison's article, I'll try taking the pictures on a bright overcast day. (That's not the only thing I learned from the excellent article.)

This is certainly not to say that one should not use a tripod. Its use is nearly always advantageous. The purpose of the letter is to prevent someone from saying "Oh! If I take that picture, I'll have to set up a tripod; it isn't worth the bother," and so miss a good picture. **Cecil Grace**

THE ILL-FATED SX-23

I read with interest Larry Rosine's story on the Skyrider SX-23. I am probably one of the few people left who worked on that radio as it left the production line. I joined Hallicrafters in 1940 and the SX-23 plus a few other models were currently being "tuned up." In those days, the people who aligned the radios were called "phasers." I was one of them.

My basic comments are that, while the SX-23 was of an unusual styling, it was a real "dog" as a radio. Very difficult to tune up, as it required a small grinding tool to shave off parts of the temperature-compensating capacitors to achieve the required results. I would say, looking back, that the Company would have suffered financially had it not been for the advent of the SX-24 and -25. You could tune those radios up in a matter of a few minutes and they held their calibration reasonably well. The low production of the SX-23 simply meant it took too long to tune up. Hallicrafters made its name by providing good quality, high-speed production on their "ham" receivers. **Clarence Zornes, W9TAL**

NEW MEMBERS

AWA welcomes the following new members. We list all new members routinely - if your name does not appear within six months, please advise the Editor. If you do not wish to be shown, just mark the application form accordingly. AWA does not provide an address list or other directory of its membership.

David **Abramson**, PA
Joseph **Actor**, KA1JK, MA
Gary R. **Albeck**, WA3ETO, CA
Geoffrey **Arnold**, England, publisher of "Radio Bygones"
Lawrence E. **Baker**, TX
Steven F. **Bacskor**, NJ
Richard G. **Best**, CA
Philip M. **Biagioli**, NY
Leonard **Bogdan**, NY, retired physicist
Marcial **Bones**, N1GET, MA
Marvin L. **Boone**, FL, Metro-plex - WNLT-FM, WHBO
Todd F. **Breed**, TX
James E. **Brittain**, GA, teaches history of electrotechnology
Alan and Melanie **Brooks**, SC
James R. **Buckley**, N4NE, FL
Fred **Bundschuh**, NY
Rudy **Burick**, PA
Lynn **Burlingame**, WA
James **Cain**, K1TN, CT, technical writer
Anthony P. **Calabrese**, MN
Brent A. **Cater**, W5FRG, AR
David L. J. **Coulter**, Australia, Telecom Australia
Gordon S. **Creed**, W7KJD, DC
Edmund **DeCann**, MN
Darwin **Demers**, ON
Ben **Deovlet**, W6FDU, CA
Larry **Dobby**, VE2YU, QU, CBC engineer
Chester A. **Dougherty**, NY
Joe **Dupre**, K1GOW, RI, 6 yrs. Navy Elec. Tech. 1st Class
Eastern Electronic Service, CT
Remo **Filippini**, Italy, radio engineer
Gregory F. **Fiore**, W3JVY, PA, Navy E. T., AT&T Bell Labs
Richard A. **Fisk**, KB9DGU, WI
Ron **Follmar**, K5GIT, TX
Jack **Gabriel**, NY
Karen **Garrison**, WA1THQ, NH
Frederick A. **Genero**, NY
Robert L. **George**, TN
Robert J. **Goad**, WA4COU, FL, TRAK Microwave Corp.
George H. **Goldstone**, W8AP, MI, attorney
Barney **Greene**, CA
Ralph L. **Hanson**, IL
Donald D. **Hauff**, MN
Randall R. **Herkness**, MI, radio dev. engr., Delco Electronics
Desmond G. **Higgs**, BC
Robert A. **Hill**, NK3W, MD
Donald C. **Holdaway**, NY
George **Huntley**, ON
Dennis C. **Ivey**, TN
Greg **Izzi**, WA
W. W. **Janssen**, K7NOM, NJ, Pacific Bell 2-way radio & microwave
Larry R. **Jeannette**, CA
Robert A. **Jones**, OH, El-A-Co Electronics
Ashley **Kennedy** III, IL
Brian B. **Kerfoot**, OH, collector
Charles H. **Kittleson**, CA
Ben **Kittredge**, WA1PBR, ME
Kenneth **Knopf**, CA
Donald J. **Koby**, IL, Koby Elec.
Steve **Krieger**, GA
Gary **Kuennen**, VA
Gregory J. **Kunka**, FL
Steven **Kunshek**, IL
Larry C. **Larson**, MI
Lennart **Larsson**, Sweden, radio engineer
John **Laws**, CO
H. Vernon **Lee**, CA
Jerry **Lefebvre**, ON
Daniel **Lennon**, NJ
Dan **Mason**, CA
John J. **McCoy**, PA
Mike and Karen **McCoy**, OK, KJ103, KNMQ, KLUC, etc.
Herbert **McDonald**, GA
Vincent T. **Migliore**, CA
James D. **Mueller**, AZ
Joe **Musachia**, DC
Mike **Nall**, NC
Edward **Nichols**, IL
Bob **Norman**, K7NWB, AZ, Motorola
William K. **Noro**, PA
Walter N. **Opdycke**, MI
Raymond **Overland**, MN
Patric **Paris**, West Germany
Harold F. **Parshall**, OH
Donald E. **Peck**, CA
Edward J. **Pekol**, W9FPE, WI, military, retired
Harry C. **Penoyer**, NY
Peter M. **Perrotti**, NY
Greg **Raven**, TX
R. P. **Renka**, M. D., KC0KT, SD
William R. **Rollins**, W4IYE, CT
George T. **Russell** II, MI
Louis W. **Rydant**, W1LNG, MA, Chief Radioman, U.S.Naval Reserve 42 yrs.
Susumu **Saito**, Japan
Ray C. **Salvo**, Jr., WB6SZZ, CA, U.S. Navy
Fred C. **Sanner**, CA
Ron **Sawley**, Sask.
Horard **Sheeran**, Australia, radio technician
Richard M. **Slabe**, NY
Earle M. **Sigler**, N5HZW, AL, retired EE for Allis-Chalmers Transformer Division
Larry **Sollitt**, WB2WBU, NY, U. S. Marine Corps
John **Stanley**, NC
Jeff **Stockham**, AL
Richard H. **Tatowicz**, NY, private satellite network, RCA, WUI
Richard **Terrell**, MA
Desmond **Thackeray**, England, teacher, R & D, BVWS author
Thomas W. **Thatcher**, Jr., W2TFT, NJ, Bell Telephone Labs
Mark S. **Townshend**, FL
Paul M. **Trepanier**, KB2IP, NY
Thomas R. **Utterback**, RI
Carlos **Vial**, CE3FCF, Chile, radio engineer
Gene D. **Virden**, CO, Virden Television
James W. **Walcher**, IL
Terry C. **Wesley**, CA
Bob **Williams**, W9DQS, WI, repair of school visual aids & projectors
Leonard **Wilson**, OH
Scott **Woodard**, TX
John **Wright**, KE2MK, NY
Richard J. **Young**, VA
[Thanks to Joyce Peckham]

HISTORICAL ARTIFACTS

Old-time ads are free to members collecting and restoring equipment for personal use. **The rules:** (1) only one per issue per member; (2) include an SASE if acknowledgement is desired; (3) material must be over 25 years old and related to electronic communication; (4) give your full name, address, and zip code; (5) repeats require another notice - we aren't set up to repeat automatically; (6) the Association is not responsible for **any** transaction; (7) we retain the right to reduce the size of the ad if over seven lines; (8) AWA does not accept commercial advertising; (9) deadline for ads in August issue: **June 9**; those received later will be held for the next issue. Mail **all** ads to:

Richard Ransley, 17 Sheridan St., Auburn, NY 13021.

FOR SALE/TRADE

Auction: AWA surplus and members' material. No minimum; everything goes. Saturday, May 5, at AWA Annex, Holcomb, NY. Full details under "AWA News."

Philco 87 (very nice cabinet), Philco 37-650 Tombstone, and several AK metal-cabinet radios (good shape). Must sell. G. A. Chehames, 227 Club House Drive, Willingboro, NJ 08046, (609) 877-5218.

Philco 50B cathedral w/loud hum. (Changing filter condensers often gets these 1931 sets going again.) Cabinet restored, grill cloth not original. $150. Also many other radios, books & tubes. Send 2 stamps for complete listing. Ron Boucher, PO Box 541, Goffstown, NH, (603) 497-2988.

Military gear: SCR-284, SCR-522, BC-728A & FT-338A, RT-18/ARC-1 & MT-230/ARC, R-19E/TRC-1, R-276A/FRC-6, R-294, DY-17A/ART-13A, PE-1100D w/field case & cables, RM-21. Many TMs - no list, send wants. Many command sets. LSASE for list. Harmon-Kardon A50K tube-type stereo amplifier, NC-173, Meissner Deluxe Signal Shifter. Wm. Bauer, W4NZY, 119 North Birchwood Ave., Louisville, KY 40206, (502) 895-3275.

Projection sets: U.S. TV T-525; RCA 8PCS41. Also Dumont 17" round-screen console with doors; 1948 Motorola chassis TS-4 7" table model. Sets are non-working, with full manuals (except Dumont). Tubes: new unused 5TP4, rebuilt unused 12KP4A, rebuilt unused 21CYP22A color CRT. Joe Anderson, Box 204, Weymouth, MA 02188.

Wilcox-Gay '39 A44 wood pin-up, $40; Emerson '39 DM331 wood, $25; both as-is. Radiola 100A spkr, $20; U. S. Radio early 30s wood horizontal, refinished, $60; Stewart-Warner '35 R140 small, refinished, $85; Setchell-Carlson 1939 413 wood horiz., AM-SW-LW, $35; Zenith '46 6D2614, $42; Arvin 40s 632 wood, $45; Philco 40-130 stubby tombstone, $50; Concord 30s bell-shaped, line cord, $60; Stromberg-Carlson '40 1110 wood, 2-band, vert. dial, pushbuttons, $65. SASE for more. Ripley, Box 9374, North St., St. Paul MN 55109, (612) 777-6791.

230-volt fans, 1-1/2 X 3-1/2. Ideal for your kW linear (or spark transformer) $5. ea. shipped. Blonder-Tongue UHF converters, bakelite or styrene (looks like small radio) $10 ea. shipped. Jim & Nadiene Farago, PO Box 6313, Minneapolis, MN 55406.

Handcrafted **diamond loop antennas**. LSASE for details. Berj Ensanian, KI3U, PO Box 3342, Williamsport, PA 17701, (717) 326-2148.

Stromberg-Carlson 635A Treasure Chest receiver, exc. cond., works, $.85/lb. (80 lbs.). Too heavy for UPS, must pick up or arrange delivery. Grunow Super Teledial chassis and speaker, out of console, good cond., not working yet, $35. National Panasonic Model T-100MD multiband, good working cond. $15. Philco transistor 700, fair-to-good cond., works, $12. Nick Lamendola, 1763 Rochester St., Lima, NY 14485.

Needles and cartridges for all phonos, 1920s to 1980s (magnetic, ceramic or crystal). Send model no., part no., and description. J. J. Papovich, 53 Magnolia Ave., Pitman, NJ 08071, (609) 582-8279.

Sony Earth Orbiter, Model CRF-5080, works, exc., with service manual $110. Louis Yadevia, 601 Church Lane, Upper Darby, PA 19082-5207.

National RBL-5 low-frequency receiver. John Webb, W6RCW, 12736 Erin Dr., Auburn, CA 95603, (916) 885-9556.

Radiola II, excellent, $350. Have AK breadboards to trade for 1930s Collins bakelite-panel transmitter. Want AK 5. Parker Heinemann, W1YG, 87 Cove Road, Lyme, CT 06371.

Rare **Victor Northern Electric** radio, Model R-21, made in Canada. Has 3 exposed 215A tubes on front panel. $175. Phillip Drexler, 1175 E. Ripley Ave., St. Paul, MN 55109, (612) 771-5691.

Surplus electronics, BC-375/191 tuning units $50, Sony 5" TVs $35, complete orig. RCA image-orthicon B&W camera chain from TV's golden days, WW II radar indicator TPS-1 $125.

Transfer svcs from old video and audio formats to new, CV, AV, recording wire, etc. Allan Weiner, 14 Prospect Drive, Yonkers, NY 10705, (914) 423-6638.

R-9B/APN-4, three, new cond. - trade for 45 tubes. Want Philco 70 speaker and audios for Marconi VIII. Desperate! Gordon Wilson, 11108 50th Ave., Edmonton, Al., Canada T6H OH9.

Scanning disc TV, with see-all parts. Meissner 1938 5" kit TV, 1940s televisions, Predictas, more! Harry Poster, Box 1883, South Hackensack, NJ 07606, (201) 794-9606.

Tektronix 130 LC meter, $25; Lafayette HA-50A 30-50 MHz FM comm. rcvr, like new, orig. box $25; Ballentine 300 AC VTVM $25. All shipped UPS prepaid. James Fred, R1, Cutler, IN 46920.

Mint **Grebe CR18** Special and Scott Allwave 12 in Waverly Grand cabinet w/all coils. Lester Rayner, 5512 N. 71st Place, Scottsdale, AZ 85253.

QSTs, complete file from April 1952 thru March 1970, $50 plus shipping. Jack Proefrock, K6QEQ, 20814 S. Hawaiian Ave., Lakewood, CA 90715.

Ten metal radios for $350. Many odds and ends. Pat Cutini, 2114 Main Rd., Corfu, NY 14036.

Large selection of vintage **Radio Handbooks** and ARRL Handbooks, plus parts and sets of 20s, 30s & 40s. SASE for list. Richard Cohen, 11802 Willow Pt. Way, Tampa, FL 33624.

Spectacular **portable** collection. Nearly 50 radios, mostly from the 1920s-30s. Extremely rare items such as 1924 Zenith Super Portable, Crosley 50P, Kennedy 311, Nazi Siemens, Operadios (2), Radiolas, camera radios, etc. Valued at $10,000+. Will sell entire collection for best reasonable offer. SASE for list. Mel Rosenthal, 5 The Strand, New Castle, DE 19720.

General Radio Signal Generator, Model 605B, in good working order except for bands 9.5-30 and 95-300 kHz. Manual, power cables and spare set of tubes. $75 excluding shipping. Arthur Harrison, 24 Fox Ridge Lane, Locust Valley, LI, NY 11560.

Sams Photofact folder No. 8 (covers HQ-129X), $6. Other folders at $4 each: 121, 191, 227, 465, 828. Jim Collier, K2QB, 100 Redwood Terrace, Williamsville, NY 14221.

Radios, books, Sams, Riders, tubes, test equipment, etc. Send LSASE. Doug McManus, KB2IAY, 20 Deland Park A, Fairport, NY 14450.

Zenith portable TV $25, Superola Grand needing cabinet work $60, two old HB radios, Emerson & Airline portables. Send LSASE for new list. Want Scott, McMurdo and old tube stereo equipment. Tim Martin, Shaker Heights, Rt 49, Pittsfield, MA 01201.

Radiola 46 and 60, Midwest DXA 19 TV, Zenith 12H695. SASE for list of over 100 radios, TVs, test equipment and misc. Dennis Smith, KN8H, Box 113, Trenton, MI 48183.

Philco 95 console available for parts or whole. Has nonrestorable cabinet, complete chassis-speaker-tapestry. U. S. Radio Apex metal AC set, restorable but rough finish. Magnavox horn, bell only, in very good cond. Want round white (nylon?) pushbuttons and 2 white "Z" knobs for Zenith 5S319 and any Stromberg-Carlson tombstones. Paul Ernst, 3465 Eddy Rd., Marion, NY, (315) 589-9471.

NOS and used radio **tubes and parts**, 1920-65. Thousands of items. No list. Write your wants w/SASE. Krantz, 100 Osage Ave., Somerdale, NJ 08083.

69 years' collection of old radios, TVs, phonos, ham, military, parts, literature, flyers, catalogs - Radio Master, Cameradio, McGee, Burstein-Applebee - books, etc. 48-page list $1. F. Yon-ker, W2IBH, 7 Old Farms Road, Saddle River, NJ 07458.

WANTED

National SW-4 for cash or cash plus mint SP-600-JX-9. Also 6199 photomultiplier tube. Robert Enemark, W1EC, Box 1607, Duxbury, MA 02331; call collect, (617) 934-5043.

Keyboard capable of generating Morse. Must be operating and complete. Four feet of 1/4" square brass rod for a 1933 TRF receiver. Henry E. Wendon, K8IKO, 55 West Riverglen Dr., Worthington, OH 43085.

Harvey Radio Laboratories 90-T manual, circuitry, antenna and plate-current meters, coils, dials. Leland Smith, W5KL, HCR-31, Box 147, Jasper, AR 72641.

Conar 400 transmitter; coils for McMurdo Silver 801, 801B, 802; Sams TSM-6, TSM-9; defunct Knight Span Master for parts (coils). Al Bernard, PO Box 690098, Orlando, FL 32819, (407) 351-5536.

Aeriola Jr., Regency TR-1 transistor, external parts for Colonial "Globe" radio, RCA table for 630TS TV. Baxter, 1133 South Clinton Ave. Rochester, NY 14620, (716) 473-5322.

ARRL manual, any from 1934 to 1940, covers missing OK, prefer no water damage. James C. Newton, 1952 E. Fork Rd., Williams, OR 97544, (503) 646-6647.

AK Model 82 chassis and speaker; black or brown 3-tube TA unit; Model 10A RF coils (tags but no binding posts); early tube unit with binding posts; detector amp (can only with tag). Have amounted variocoupler for trade. Also need info on 1917 Premier xmtr and 1917 Johnson & Phillips Mark III tuner (Marconi). Larry DiBarry, 212 North 6th St., Chambersburg, PA 17201, (412) 263-3804.

Bugs: German, Canadian, Mecograph and other early American. Bill Smiley, WB4EDB, PO Box 5150, Fredericksburg, VA 22403.

Manual for Hickok Model 610 TV-FM Signal

Generator, Hickok Model 5002C 20-MHz scope, Magnavox B&W TV 7T5003 Chassis T959-02A. Also need escutcheon and glass for RCA Victor Mod. T61. Will do servicing on antique radios in the Guelph-Toronto areas in exchange for collectables. George Huntley, R.R. #4, Rockwood, Ontario N0B 2K0.

Knobs for Fada 480A receiver or details of same; chart for Weston 771 tube checker; cabinet and panel only for Grebe MU1. Does anyone know of source of blue mirror glass to restore a Sparton 557? Have reprint of Scott's Radio Handbook (N2) 1927. Full of old ads, circuits, call signs, hints and construction articles. $12.50 U.S. A. R. Williams, 26 Centre St.,Invercargill, New Zealand.

Military radio gear - WWII and other ground vehicular radio sets and components wanted. Need transceivers, power supplies, mounting racks, antennas, accessories, literature, etc. This gear will be installed in restored military vehicles. Bill Kish, 800 West End Ave., New York, NY 10025, (212) 666-8857.

Quack medical violet-ray devices and any other early interesting types. Richard Cane, 8391 N.W. 21st St., Sunrise, FL 33322, (305) 741-6838.

Novelty radios; 50A1 ballast tube; original Sams Photofact folders #1, 2, 5-7, 9-20. SASE for list of literature, 40s and 50s radios. Rod Galloway, 2220 Woodbury Rd., Melbourne, FL 32935.

Studio TV cameras: RCA TK41, TK42, General Electric B&W Orthicon. Also GE studio equipment, both video and audio; very early 21" GE color console. Bruce Gentry, KA2IVY, 622 Plymouth Ave., Mattydale, NY 13211, (315) 455-725.

Worlds Record Super 8 or 9 superhet with front panel so marked; any other pre-WW II radios by E. H. Scott and/or Scott Transformer Co. Can pick up anywhere in the country. Jim Clark, 1292 Starboard, Okemos, MI 48864, (517) 249-2249.

7094s for Hallicrafters HT-41 linear or info on converting to suitable, more readily available substitute tubes. S. Kiraly, WA2O, 51 Ramon Blvd., Freehold, NJ 07728, (201) 462-2705.

German tubes, late 40s to 60s, especially "magic eye" types. Also interested in tube books, test gear, anything relating to German BC rcvrs, or info on Max Grundig. George Russell, 8120 Metro Pkwy., Sterling Heights, MI 48078. Danke!

The following sets - desperately seeking, preferably in working cond.: Stromberg-Carlson 1A (father had one in '26!), AC Dayton XL-5, Crosley 5-38, Kennedy Models V or XV, Tuska 224, Freed-Eisemann NR-5 or NR-7. Dr. C. Milego, 32 Birch Grove, Windsor SL4 5RT, England.

Tektronix, Inc. product catalogs before 1965. Don Knotts, 3158 N.E. Azalea, Hillsboro, OR 97124.

Motorola Golden Voice car radio schematic and alignment procedure or any info. Set has electric motor preset tune, 8 tubes, P-P 6V6s, S/N 38-609143. Will pay all costs. Ted Baker, P.O. Box 582, Bathurst, N.S.W. Australia 2795.

Crystal sets for the largest crystal set collection in Europe. Top dollar paid! Erwin Macho, Ambrosweg 17/A/8, A-1230 Vienna, Austria.

Tektronix 570 curve tracer. Early non-RCA superhets and NOS WE 215A tubes. Pre-WW II transmitter, commercial or amateur, spark key or spark items, Meissner TX coils, FB-7 coils. Have spark items and TX and pre-1940 RXs for sale. S. Mount, K2OA, 35 Grand St., Highland, NY, (914) 691-7957.

Raytheon PR 51, 5R or FR81; Emerson 747; Sylvania 454; RCA 33 metal legs and 100 B speaker. Also Magnavox US-made transistor radio. Jerry Talbott, 1440 SW 239th St., Hillsboro, OR 97123.

Manuals for test gear: Ballantine 300 VTVM, Heath IM-1 intermod analyzer, Kay Vari-Sweep, General Radio 1632A bridge, Monacor ARF-200 sig. gen., Eico mux adaptor, Browning Labs T-100 mux tuner. Copies OK. Chuck Porter, 1934 Fifth Ave., Troy, NY 12180.

RCA 5T4 table-top. Cabinet similar to Philco 38-9 (FOS p. 125) but has same dial as RCA 7T or 5T on FOS pp. 151-2. Complete or incomplete, dead or alive. Dave Smith, K9UIM, 906 S. Maple, Box 81, Olney, IL 62450.

Philco console pre-WW II BC-SW rcvr with slide-rule dial, thumbwheel vol. & tuning and with square cabinet. Prefer complete set with good cabinet requiring electronic work. Ken Hodge, KB4CM, 42846 Cinema Ave., Lancaster, CA 93534, (805) 945-4702.

Cardwell variable condensers, three early, 250-mmfd 11-plate or 500-mmfd 23-plate with brass end plates. Wes Chatellier, W5DPM, 1950 Chevelle Dr., Baton Rouge, LA 70806.

Telegraph bugs of unusual manufacturers and unusual configurations such as verticals, right-angles, or key-bug combinations. Patent models most welcome. Gil Schlehman, 335 Indianapolis Ave., Downers Grove, IL 60515, (708) 968-2320.

Executone audio amplifiers, any information regarding Model PB575 power booster believed to be made by Western Electric NY. Also looking for a good and simple schematic for tube audio preamp. Jean-Marc Turgeon, 2730 Dandurand, Montreal, Canada H1Y 1S9.

Majestic Treasure Chest Model 625A: Need photo or sketch with dimensions of the wood pieces that hold down leather straps. Thanks! R. Haworth, 112 Tilford Road, Somerdale, NJ 08083.

Duck and other early **catalogs**, Murdock 500 driver, clean Radiola III balanced amp., good Radiola III amp xfmr w/CT, complete base for UZ-1325, base cover plate for Music Master horn, real photo postcards of early radio equipment, pair of knobs for Bendix green Catalin model 526.

John Pisarski, 114 Evans Rd., Trooper, PA 19403.

Western Electric receivers, 2A & 2B tuning unit, 2A current supply. WE 201A, 208A, 209A, 210A and 217A tubes. Marc Ingenthron, 9748 Outlook, Overland Park, KS 66207, (913) 642-4767.

Zenith Royal 760 chassis 8AT42Z2: four knobs for same, or reproduction. Mario Portalatin, 1628 NW 16th St. #3, Miami, FL 33125.

Crosley pup "Bonzo": Papier-mache statue of black-and-white dog with earphones. 1920s promotion for Crosley Pup radio, about 8" tall. Jahan Acciavatti, P.O. Box 231, Southborough, MA 01772.

Hammarlund Super Pro 110/210; clean Viking Navigator and E. F. Johnson bug; concentric tuning knob for RCA Model 121 (7/16" shaft); HRO-5 LF coils; expertise on Viking Ranger models. Brian Roberts, 3068 N. Evergreen, Pittsburgh, PA 15237.

Information about **VIDOR** C.V. 254 ERITH all-band receiver. Four-tube TRF, 13.5-2000 meters, using VP1322 RF, SP13C det., and C70D audio tubes, believed British. Thanks! Harlow Beene, PO Box 25824, Albuquerque, NM 87125.

Address of Superior Instrument Co. I need instruction book for Model TB 55 tube tester. Also need electric cord for 4-tube Tiny Tim Junior which uses a special cord. Edmund DeCann, 307 3rd Ave. W., Osakis, MN 56360.

Australian HRO: Any information on Mod. AMR-101 copy by Amalgamated Wireless Ltd., Sidney. H. T. Brown, POB 3187, Lancaster, CA 93586.

Detrola receiver: Information on or schematic of AM-SW 6-tube pushbutton AC-DC. Thanks! Bill Gilbert, N2CAN, 33 Main St., West Sayville, NY 11796.

Garod Model V and Gilfillan GN2 receivers; 2 Western Electric 205D or 205E tubes; restorable WE 14A amp.; any WE components and lit-erature; 6-tube Neutrodyne receiver shown in VR p. 132; Hytron 114B tube. Tad Drogoski, 507 Coal Valley Rd., Clairton, PA 15025.

National SW-3 coils, 80M and 40M, or coil information; 4-pin coil forms. Paul Wnek, N3KR, 2310 Arthur St., Philadelphia, PA 19152, (215) 739-8633.

Radiola 26 portable receiver: driver and handle for same. Will buy outright or trade Radiola X or Atwater Kent type 5V driver. Ernie Nagy, 1599 Boxford, Trenton, MI 48183, (313) 676-6491.

Zenith Model 3R Parts. Will purchase junk chassis. Bill Boehly, 92 Salem Rd., Rochester, NY 14611, (716) 338-7613.

American Bosch: Comments and schematics to restore Model 5 and 7A; Philco Model 46-350. Have for sale over 200 tubes in two lots, 1930-50. SASE for list. John Laws, 48 West Brookside, Colorado Springs, CO 80906.

RCA Model 100 speaker - information: what are the two types of paper used for cone & border, colour & finish used for casing, and where can I obtain materials for restoration. Also want RCA Model 17 pot-metal tuning dial wheel & escutcheon, volume knob, and pilot lamp shield; and RCA and Magnavox speakers. Eddie Maddocks, 190 Roberts Road, Greenacre, N.S.W. Australia 2190, tel. 02-642-4197.

Speaker, 10", for Zenith Model 6R087 w/field & voice coil. P/N 49-526 (or 49-542, 49-563). Also phono unit for same. Jeff Fiet, 2 Hawk St., Scotia, NY 12302, (518) 370-8037.

Vintage radios: aviation, naval, field, portable military; power supplies, connectors, cables, dynamotors, parts sets, manuals and films. Charles Di Cecca, 501 Mystic Valley Pkwy, Medford, MA 02155, (617) 396 9354.

WW II radar equipment units and/or complete systems, or information leading to same. Al Weiner, Britton Road, Monticello, ME 04760, (207) 538-9538.

Meissner tuner, 5-band 140 kc - 42 mc, part #13-7616, or substitute. Gene Setwyn, 3114 S. 136, Reedsburg, WI 53959, (608) 524-3833.

Bell wire: three rolls of the old style used in houses, approx 1" rolls with copper wire (18-ga) with cotton wrap and wax coating with an orange or blue tracer. Leslie Bohl, 7208 E. Woodward, Manteca, CA 95336.

Anything connected with the "Suitcase Portable" on cover of QST Sep. '51 and construction article QST Dec. '51. Information, copies of the rig, modifications, correspondence with the author and builder, anecdotes, memories. Also want mint QST Sep. '51. Bill Skidmore, VE3AUI, RR 1, Hyde Park, Ontario N0M 1Z0.

Owners **manual** for Lechtrotech oscilloscope #TO-55; last produced roll-chart/roll-book for Jackson tube tester #658A; clock crystal for Zenith clock radio #179G. NOS 12LP4A CRT, Zenith converter #CV524. Jasper De Lasse, 17 Seldin Ave. CR13, Richmond, NY 10314, (718) 761-6559 or 981-1218.

HF-150 transmitting tube or equivalent. Operating instructions for Boonton Q-meter 160A. Harry Goldman, RR6 Box 181, Glens Falls, NY 12801.

Crosley Model 02CP schematic, set control knobs, caps for pushbuttons. Also need 450-pF wide-spaced cap., National Type S-101S. G. Coupler and 2 Hammarlund MC-100-S var. caps. George Hughes, 22 Kline Rd., Southwick, MA 01077, (413) 569-5360.

DV3A tube(s) with filament intact; also DV3 or DV3A tube cans (Saga, p. 302). Charles Swigart, 3717 Burton Ave., Toledo, OH 43612.

Hammarlund transmitter HX50, any cond., manual, and power transformer needed. Reno Rug-

gere, 504 Grill Ave., Shillington, PA 19607.

Hallicrafters SX-76, SX-122A; Collins 51J-4. Have Breting 12 for sale or trade. Jerry Beaudin, PO Box 146, Curtis, MI 49820, (906) 586-3021.

Million Radio and Television Laboratories products, test equipment and sound systems manufactured in 1930s in Chicago. Sloan Million, 102 Ithaca Dr., Colorado Springs, CO 80911, (719) 392-5605.

Brown Brothers keys, paddles, and company brochures on same. Vibroplex bugs. Tom French, 120 Great Road, Maynard, MA 01754, (508) 897-2226.

Howard Model W, also known as Explorer, vintage 1933-34; and Model Grand, 1935-36. Both use multiple chassis and 19 tubes but have different circuitry. Any literature, partial sets, first-hand info would be appreciated. Thomas Peters, PO Box 3925, McAllen, TX 78502.

Philcos and Belmont 6D-111 in nice original cond.. Also Philco advertising, neon, etc. Claude Poetti, 17940 Harman, Melvindale, MI 48122, (313) 389-2662.

Books by Supreme: Radio Servicing Course, 224 pp.; Advanced Radio Servicing (30 lessons); and Pre-War Record Players. Paul Williams, 2364 Beaver Valley, New Providence, PA 11560-9622.

QSTs for 1916-17. Bob Arrowsmith, 3505 Woodburn Rd., Annandale, VA 22003, (703) 560-7161.

Magnetic Coil Winding Machine, the type made by the Geo. Stevens Mfg. Co. Can be either cam- or gear-driven. Dan Healy, PO Box 764, Woodacre, CA 94973, (415) 488-4596.

Arcturus tubes, blue glass only. Need the following to complete my collection: RE1, RE2, SO1, SO2, A48, AD, AE, AF, AG, PA, PZH, 150 and 020/120 (if made). Will buy, or have Dutch Philips tubes 1925-30 to trade. Fin Stewart, PO Box 44, Budgewoi, N.S.W. 2262, Australia.

Radio Review, Television, and Television News magazines. Also early TVs. Don Hauff, Box 16351, Minneapolis, MN 55416.

AK Model 20 plus matching AK horn speaker, or any good original unrestored-cond. 1923-27 battery table set, e. g., RCA or Crosley. Please state price in first letter; all replies will be answered. David Coulter, Flat 39/13-15 Mowatt St., Queanbeyan, New South Wales, Australia 2620.

Marbled green Catalin case for Bendix 526-MC. Do you have this Bendix with a broken black half? I don't need corners or knobs, just top cover. Also MacIntosh MA6 FM MPX. Tim Fuss, 573 Grand Ave., Rochester, NY 14609, (716) 482-8963.

Novelty radios and original advertising for any novelty radio. Also want grandfather clock radios. Clifford Watts, 51 Glendale Rd., Brantford, Ontario, Canada N3T 1P5, (519) 753-5087.

AK 93, 702, 735 and others; chassis for AK 184; AK F speaker; tuning dial for Crosley 58 Buddy Boy; AK G and R horns. Bob Nicholson, 3423 S. Long, Topeka, KS 66605, (913) 266-9473.

OTB back issues. Need help in building a complete set for research and writing. Doug Penisten, 412 W. Choctaw, Tahlequah, OK 74464, (918) 456-4611.

Philco plastic dial P/N 27-5189 for a Model 37-604. Must have legible numbers, no cracks. Bill McGowan, 2029 Harbor Blvd #9, Costa Mesa, CA 92627, (714) 631-0920.

Federal "Little Pro" disc-recorder-radio combination. Also looking for a restorable National HRO receiver in "as-is" cond. Gaylord Ewing, PO Box 144, Morris, NY 13808.

Amrad pre-1926 sets. Also Amrad parts, accessories and literature. Richard Sharisky, PO Box 521, Belmont, MA 02178, (617) 484-5784.

For **Stewart-Warner** 950 console: 9" dynamic speaker, base mounted on a 2-1/4 X 4-1/4 rectangular bolt pattern. Leonard Aquilino, Jr., 336 Hickok Ave., Syracuse, NY 13206.

Capacitor analyzer, Solar Model CC-1-60 or Century Model CT-1 with operating instructions and schematics. Schematic and operating instructions for Freiler stethoscope, Model TS-3. Paul M. Williams, 2364 Beaver Valley Pike, New Providence, PA 17560-9622, 717-786-3803.

"Electronics," Oct. 1930, Jan. 1931 issues; tube socket for Western Electric 212D and Eimac 1500T; xmitting, industrial and special-purpose tube manuals; OTB prior to Vol. 13. John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062, (913) 782-6455.

German, Japanese, any cond., plus any informational paper. Special interest in studying, restoring to full on-air operation. Also want USCG, Forest Service gear, (Australian) Kingsley KRC-11. Hugh Miller, KA7LXY, 6400 Maltby, Woodinville, WA 98072-8375.

Spherical audions, Audiotrons, tubes from de Forest, Weagant, Singer, Schickerling, and other unusual tubes in any size or cond. Will pay fair price or exchange. Would like to correspond with other tube collectors. Udo Radtke, DJ5KG, Im Fuchtei 143, D-4830 Gutersloh, West Germany, 011/49/5241/51921.

Musica radio made ca. 1948 by Radio Communications Engineering Company, NYC. In a mahogany cabinet; panel disguised to look like a receiver but actually is a xtal-controlled transceiver. Also need manual for same and any info on company. Al York, One Main St., East Hampton, NY 11937, (516) 324-1024.

Photos of Nikola Tesla's transmitting station at Shoreham, LI which were taken between 1901-17 (copies OK). Please quote. Leland Anderson, 2525 So. Meade St., Denver, CO 80219.

BOOK AND MAGAZINE REVIEWS

Edited by Bruce Kelley

WIRELESS COMMUNICATION IN THE UNITED STATES: THE EARLY DEVELOPMENT OF AMERICAN RADIO OPERATING COMPANIES

By Thorn L. Mayes

Orderable from The New England Wireless and Steam Museum, Inc., 697 Tillinghast Rd., E. Greenwich, RI 02818; $29.95 plus $3.00 for shipping and handling; also from Antique Electronic Supply and presumably the other usual sources. Paperback, 242 pp., 176 illus.

This book unites a collection of papers written over a span of 25 years or so by Thorn Mayes, W6AX. Some of them were published by AWA, SOWP, and ARCA. What we now get is a coherent history of the brash early years of commercial wireless and the companies that built the industry. The firms covered are the de Forest group, the Gehring operations, United Wireless, Continental Wireless, Atlantic (Telefunken), Marconi of America, HOMAG (Tuckerton), the Federal Telegraph group, and Globe Wireless. Most of these firms were seriously intended to handle traffic; a few were simply stock frauds; but all formed a fascinating picture of technical progress amid commercial rivalry. Flow charts lay out the complicated histories of reorganizations.

Appreciating the commercial picture requires understanding the technology. The book includes a chapter summarizing the development of transmitters and receivers, illustrated with charming examples taken mainly from the New England Wireless and Steam Museum. The Globe chapter includes the story of the Goddard tube oscillator and Heintz and Kaufman's struggle with RCA over patent rights. We are offered statistics of the growth of wireless stations, commercial and government, ship and shore. There is a biographical chapter on Harry Shoemaker, a talented developer who has received inadequate recognition. The 1909 broadcast operation by SJN in San Jose is documented. There is good coverage of the Alexanderson and Goldschmidt alternators, engineering marvels of the Teens. A lengthy series of letters by early wireless figures (Elmer Bucher, Greenleaf Pickard, Arthur Isbell, George Clark, Lee de Forest, William Dubilier, Lloyd Espenschied, Harold Beverage, Paul Godley) adds insight. A final useful touch is an text index of individuals, by name. The photos are rare gems, and there are diagrams of much of the equipment.

Mayes drafted this work, but Arthur Goodnow, Bob Merriam, and Nancy Merriam invested a huge effort in drawing it together. Comparing one of the drafts with the final chapter makes this clear. The final product is nicely executed and appealing. It contains a lot of irritating typos but they don't spoil the history. The writing style is relaxed, nonacademic, but documented with references.

This book is both good (entertaining and informative) and good value. Wireless history has been blessed in recent years with carefully researched histories (the H. G. J. Aitken pair and Susan Douglas' work, for example), but for all-around worth the Mayes book is *it*. [LAS]

RADIO BYGONES

Numerous club publications are devoted to old-time radio, but few commercial ones treat this area. Radio Bygones is a full-size glossy British magazine recently launched for vintage radio enthusiasts. The two issues I've seen appear very informative. Subject matter covers a wide range of early broadcast sets and associated equpment, plus articles of general interest to the radio historian. Outstanding are sharp color photographs of early receivers. There is an advertising section for those interested in purchasing vintage equipment.

Cost in USA is £13.00 surface mail and £18.00 airmail, by Mastercard/Visa or Sterling-denominated check payable to G. C. Arnold Partners, 8A Corfe View Rd., Corfe Mullen, Wimborne, Dorset BH21 3LZ, England. [BK]

1990 CATALOGS

VESTAL PRESS, 320 N. Jensen Rd., Vestal, NY 13851 ($2)

A source for almost all books dealing with early radio nostalgia, repairs, and collecting. A thick colorful catalog offering one of the largest selections of books covering collectibles ranging from motorcycles, trains, and player pianos to radios. The book is worth the $2 just to look at. A fascinating trip into the past. [BK]

ANTIQUE ELECTRONIC SUPPLY, 688 W. First St., Tempe, AZ 85281

The leading supplier of early components and tubes. Tube prices are much less than most current listings. They include such early types as WD-11, 201A, 227, etc. The catalog lists replacement power and audio transformers, capacitors, headphones, receiver kits and power supplies. A well established and reliable supply source for the radio collector/restorer. [BK]

YEARY COMMUNICATIONS, 12922 Harbor Blvd., #800, Garden Grove, CA 92640.

Jim Yeary has published a new sales catalog offering galena crystals and catswhiskers for crystal sets, coil forms, wire, RF chokes, knobs, audio transformers, headphones, power supplies, etc. In addition, there are listed complete crystal and 2-tube receivers. The prices appear quite reasonable. [BK] However, this material should be taken with the ol' "grain of salt": some of the product descriptions are, um, implausible ("this [crystal] receiver is so powerful, you can use a telescopic antenna that mounts on the back." "The regeneration circuit has been expertly designed to prevent feedback into the antenna" "[A]dditional 'tickler' coils to increase the effective inductance for higher sensitivity and selectivity" and, for a radio with Type 30 tubes, " [E]ffective heat transfer [is] accomplished by utilizing original phenolic sockets." [LAS]

LINDSAY'S ELECTRICAL BOOKS, Lindsay Publications, Inc., PO Box 12, Bradley, IL 60915-0012, (815) 468-3668.

This catalog offers an interesting variety of paperback reprints: the Gernsback Official 1934 Short Wave Radio Manual, the 1924 Henley's 222 Radio Circuit Designs, the 1938 anniversary issue of "Radio Craft," the WW II-vintage Radio for the Millions produced by "Popular Science," and a good many others. It lists Alan Douglas' Radio Manufacturers of the 1920s. There's a variety of material on building Tesla coils, making neon signs, etc. I have no personal experience dealing with this firm, but the catalog looks quite interesting. [LAS]

FRED ALLEN: HIS LIFE AND WIT by Robert Taylor (Little, Brown Co., $19.95).

Allen was a radio star for 18 years but now is almost a forgotten man. Perhaps that is because he never made the transition to television as did his contemporaries in radio and vaudeville, George Burns, Bob Hope and Jack Benny.

John Florence Sullivan adopted the name Allen when he took to the road as the "World's Worst Juggler." He was 20 years old. This lead him into comic vaudeville and then radio where he was known for his quick ad-libbing and bon mot. As an example, Allen wrought the conversation twist, "Who was that oboe I saw you with last night?" Reply: "That was no oboe; that was my fife."

The author captures that gentle touch, the forgotten warmth, corny ethnicity and famous feud with friend Jack Benny. It's good nostalgic reading for the radio buff without the current vogue of "upclose and personal" gossipmongering. [BK]

Museum News

ATWATER KENT MUSEUM FEATURES LOCAL RADIO ACTIVITIES

As reported in last August's OTB, Philadelphia's Atwater Kent Museum is currently featuring a special exhibit devoted to radio activity in the local area from 1920 to 1950. Displays cover early stations and radio manufacturers - notably Atwater Kent and Philco. The announcement brochure features photographs of Gimbel Brothers' pioneer station WIP.

The Museum was founded by Atwater Kent for the purpose of preserving and perpetuating Philadelphia history. It is located at 15 South 7th Street between Market and Chestnut. Hours are Tuesday through Saturday from 9:30 AM to 4:45 PM. Admission is free. For more information, call (215) 686-3630. [BK]

FOOTHILL MUSEUM LOOKING BETTER

The well known Foothill Electronic Museum, located on the Foothill College campus (Los Altos Hills, CA) was ordered by the school administration to be closed February 15th. Established 17 years ago by the Perham Foundation as a non-profit museum, it was partially funded by 25 Bay Area electronic companies and interested parties. Proposition 13 left both the school and the museum with financial problems. It left the museum without a paid curator and the school wanting the building for classrooms.

The Foundation strongly opposed the closing. It fought back with a lawsuit handled by CHRS/AWA member Bart Lee, aided by Mike Adams, Paul Bourbin, George Durfey, Will Jensby and others. The foundation argues, among other things, that it has an effective equity interest in the building, having contributed $150,000 (in Sixties dollars) to build it. March 30 was the original deadline for vacating the premises. On March 26, the Foundation obtained a temporary restraining order that effectively stops the clock, but requires posting a $150,000 bond.

The Foundation has established a "Fund for Justice" to fight the case and assure a future for

the Museum. The address: 101 First St., Suite 394, San Jose, CA 94022. Contributions can help turn the situation around, and are most welcome.

The collection is one of the finest in the country. It includes a huge Federal arc magnet and chamber, a superb mockup of the SJN broadcasting system of 1909, Western Electric broadcast transmitters from the 30s, and a fine collection of de Forest artifacts and papers. [BK/LAS]

THE ARC TRANSMITTER AT THE FORD MUSEUM

My report on the 1907 de Forest arc radiophone at the Ford Museum (Feb. OTB, p. 47) brought several queries, including "What is the difference between an arc and a spark transmitter?"

A simple explanation is that the spark transmitter generates a radio signal by high voltage (kilovolts) flowing across a gap. The resulting signal is extremely noisy, unsuited for voice transmission. Keying is accomplished by breaking the primary of the high-voltage transformer.

The arc transmitter was invented in Denmark by Valdemar Poulsen. A radio signal is developed by relatively low DC voltage (about 500 V) across two electrodes, generating a relatively steady, continuous signal usable for voice transmission.

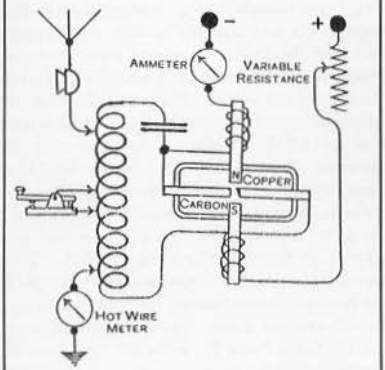
There were advantages and disadvantages to the arc. A disadvantage was that, with most designs, it had to run continuously during transmission. Keying for Morse use was accomplished by changing the wavelength, resulting in two signals: one to be copied and the undesired one (backwave).

The other disadvantage was that it could not be copied by crystal detectors and other non-oscillating receivers. This was usually overcome by a heterodyne oscillator, often a small arc, or a "tikker" chopper wheel at the receiving end. These devices are on display in the AWA Museum.

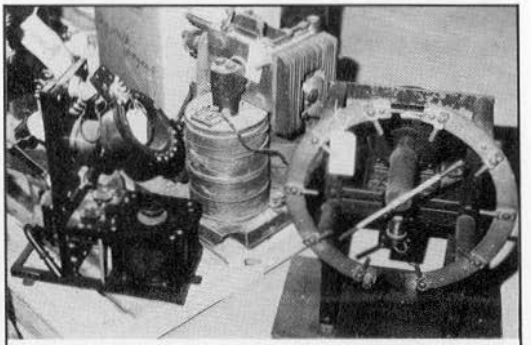
The big features of an arc transmitter were its efficiency and clean signal, allowing voice transmission with low-power units. This was done by inserting a carbon microphone in the antenna circuit - crude but workable. Since the antenna current was rather high, there was frequently a need to use several microphones in parallel. (see the Ruhmer multiple unit on the same OTB page). Another question: "Where was the microphone for the 1907 de Forest transmitter?" If you inspect the picture closely, you will note mounting screw holes in the left panel. For some reason the microphone had been removed some time in the dim past.

The early 1920s found 500- and 1000-kW arc transmitters with giant magnets and rotating electrodes. The arc became obsolete with the development of Alexanderson alternators and then high-power transmitting tubes. One remaining is a 30-kW Federal unit on display in the Foothill Museum. Of interest, the arc did not function well below 600 meters and therefore never gained favor with the radio amateur. [BK]

[Perhaps another way to look at the difference between transmitters is as follows: the spark is a switch that closes at an audio rate, sending pulses of energy into a tuned circuit that "rings" at an RF rate. The resulting radio signal dies down between sparks; it has a "decrement" that defines how fast the wavetrain fades away. The arc, occurring continuously in a magnetic field, is a negative-resistance device that continuously feeds energy into the tuned circuit. Modern readers may think of it as a tunnel diode the size of a garbage can.]



Low-power Poulsen arc transmitter.


Poulsen arc converter in Ford Museum warehouse: 1914 German receiver on left, the arc unit, Marconi rotary spark gap on right. A tag written by George Clark indicates the arc unit was bought by the U. S. Navy in 1906 to compare with existing spark transmitters.

THE MUSEUM

New equipment in AWA Museum (sets, etc.): Richard Eisenhart; Jim Kirkgasser, WA2ELA; Fred Linn, W9NZF; Paul Trepanier, KB2IP. Monetary donation: Dr. Richard Dollinger.

MUSEUM ACTIVITY

We're currently working with Association member Marie Hewett of the Strong Museum staff to assemble a display of broadcast receivers for a large exhibit to open at the museum in Rochester in 1991. Its theme will be "Radio in the Home: 1920-1940." Jack Wenrich is assisting.

The AWA museum will open for the season on May 6. Much work has been done by the volunteer staff, including setting up a display of Major Armstrong's personal artifacts. This material will be described in a future Bulletin.

MUSEUM LIBRARY

The Association's library has a large collection of photos, slides, movies and tapes. The latest video tape is one transferred from slides to a VHS cassette. Titled "The Early Years," it shows the first years of amateur radio and the beginnings of the ARRL, narrated by co-founder Clarence Tuska. The program is highlighted with rare photographs and sounds of spark transmitters. Chuck Bliley made the transfer.

On the subject of tapes, a recent inventory of reel-to-reel recordings and audio cassettes revealed an astonishing number of voices of well known radio personalities. Here is an abbreviated list. As a radio historian, how many can you recognize? E. F. W. Alexanderson, Edwin Armstrong, John Bardeen, Jack Binns, John Bose, George H. Clark, Lee de Forest, Leon Deloy, Lloyd Espenschied, Bill Eitel, Hugo Gernsback, Paul Godley, Raymond Heising, Herbert Hoover Jr., Adm. Sanford Hooper, Harry Houck, Clarence Mackay, Gulielmo Marconi, R. H. G. Mathews, Graham McNamee, G. W. Paget, Haraden Pratt, John Reinartz, David Sarnoff, Emil Simon, Clarence Tuska, Gerald Tyne, and Owen D. Young. -BK

AWA ELECTRONIC COMMUNICATION MUSEUM

Location: Village Green, Rtes. 5 & 20, East Bloomfield, New York
Hours: May 1 through October 31: Sunday, 2-5 PM; June 1 - August 31: Saturday, 2-4 PM; Wednesday, 7-9 PM. (Closed Holidays)
Group tours by appointment: 716-657-7489
Museum telephone: 716-657-6260
Amateur Station: W2AN
FREE ADMISSION

ANSWERS (VERY COMPRESSED): **Alexanderson** was developer at GE of the high-frequency alternator, of disc TV systems, etc. Edwin **Armstrong** gave us **FM** radio and the regenerative, superregen, and superhet receivers. **Bardeen** was a 1947 co-inventor of the transistor. **Binns** was the operator on the SS Republic; his "CQD" call was credited with saving 1400 passengers after a collision in 1909. **Bose** was an assistant of Armstrong at Columbia University; became vice president of the Radio Club of America. **Clark**, developer of radio gear for the Navy in the Teens, became RCA official historian; built the "Radioana" collection in the Smithsonian. **de Forest** gave the world a string of failed businesses and the triode vacuum tube. **Deloy**, F1AB, took part in the first two-way amateur transatlantic contacts (110 meters, 1923). **Espenschied**, wireless operator, went on to AT&T; was co-patentee of coaxial cable. **Eitel**, W6UF, co-founded tube maker Eitel-McCullough. **Gernsback**, of the Electro Importing Co., published a series of science-fiction magazines, Radio-Craft, etc. **Godley**, 2ZE, of the Adams-Morgan Co., went to Scotland for the 1921 amateur transocean trial and heard 30 U. S. stations. **Heising**, at Bell Labs, devised the AM modulator named for him. **Hoover**, W6ZH, was president of Aeronautical Radio Inc. and the ARRL. **Hooper**, Director of Naval Communications, figured in the 1919 deal to set up RCA from American Marconi assets. **Houck** was a prolific inventor, co-worker with Armstrong, etc.; benefactor of AWA and ARCA. **Mackay**, a "silver king" from Nevada mining, founded Mackay Radio and Telegraph Co., one-time IT&T holding, still in business. **Marconi** turned laboratory knowledge about electromagnetic waves into practical radio communication and a number of companies still with us. **Mathews** built station 9ZN and co-founded Zenith. **McNamee** was a popular sports announcer on WEAF. **Paget** assisted Marconi's 1901 transatlantic test. **Pratt**, 1908 amateur, became an IT&T executive and major figure in the IRE. **Reinartz**, 1XAM, developed the tuner named for him, popular amateur receiver of the early 1920s; worked Deloy. **Sarnoff** went from office boy at American Marconi to chairman of RCA. **Simon** made wireless gear, ca. WW I; later apparently formed the Universal Wireless Communication Company (1929-30) to compete with Western Union. **Tuska**helped establish the ARRL, ran the Tuska Radio Co. in the 20s, then became a patent attorney at RCA. **Tyne** wrote Saga of the Vacuum Tube, *the* basic reference on tube history. **Young** was president of General Electric during the Westinghouse-GE-AT&T deal to start RCA. -LAS